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Unhappy Days for Lead and Zinc

LAST year the average London spot metal price for lead was £72, compared with £71 in 1959, £73 in 1958, and £97 in 1957. On overall market performance, therefore, it can scarcely be said that lead has shown much positive response, as yet, to the voluntary cuts in production and exports announced at the inaugural meeting of the International Lead and Zinc Study Group in April, 1959, which, however, have at least prevented the situation from getting further out of hand.

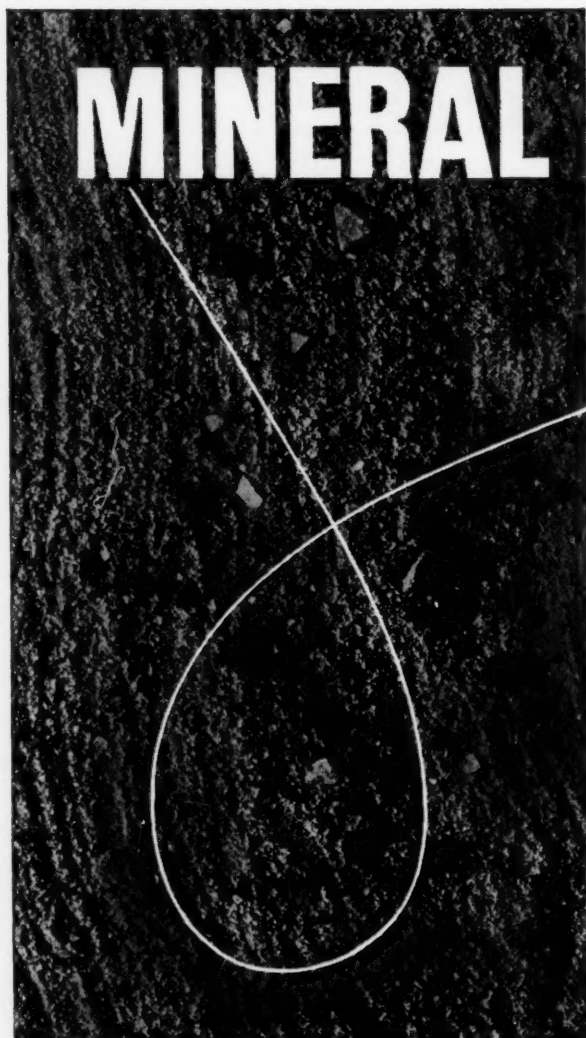
Zinc, on the other hand, averaged £89 last year, against £82 in 1959, as little as £66 in 1958, and £81 in 1957. On the face of it, this suggests that the curtailments announced after the 1959 conference, which were lifted at the end of January last year, have led to a substantial recovery in prices.

Unfortunately the immediate position regarding both metals is less favourable than comparison of the average annual prices might suggest. Towards the end of last year zinc prices fell very sharply to the lowest level since July, 1959, while lead prices followed a similar pattern. At the time of writing cash lead is in the region of £63½ and cash zinc of £78½. Both prices are lower than those ruling 20 months ago, when the voluntary restrictions were announced.

The direct causes of the decline in the L.M.E. prices last month were a heavy influx of zinc from the United States and of lead from Spain, coupled with the slackening of activity in the motor industry (by no means confined to Britain) which now overshadows the immediate outlook for zinc. The real nigger in the woodpile, however, has been the growing surpluses inside the United States. Notwithstanding the fact that the American producers were not party to the voluntary agreement to restrict output, and despite the support provided by the quota restrictions, lead production in the United States fell last year to 239,000 s.tons, the lowest since 1900, while zinc production at 427,000 tons was only slightly higher than in 1959.

Whereas zinc consumption had been expected to rise last year by 10 per cent, it actually declined by 9 per cent from 996,000 to 906,000 s.tons. Consumption of slab zinc in December fell short of production by 27,000 s.tons. Moreover, according to the Department of Commerce, little if any, improvement is foreseen for the current year.

One of the factors contributing to the decline was the introduction by American manufacturers of the compact car. According to Mr. Simon D. Strauss, vice-president of ASARCO, the compact car uses an average of from 25 to 35 lb. of zinc against 60 to 70 lb. in a full-size model. Strikes at U.S. zinc smelters and mines helped to maintain the basic quotation at 13 c., but the settlement of these disputes led to a confused market situation, with sellers offering concessions of up to \$10 a ton below a "nominal" price of 12 c. (The official quotation is now 11½ c.) Another consequence of the growing surplus was a steep increase in zinc metal exports from the



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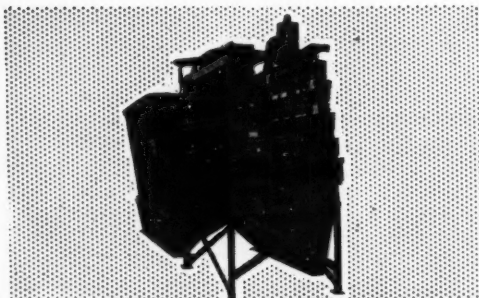
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United States, which amounted to about 12,000 tons in November and 18,000 tons in December compared with 3,000 tons in June. As compared with 1959, the year's exports of slab zinc increased four-fold—for producers in other countries, surely the unkindest cut of all! According to the American Zinc Institute's figures, U.S. stocks rose from 154,419 tons to 190,810 tons during the year.

Judging by the official communiqués which have followed the meetings of the Lead and Zinc Study Group, the statistical positions of both metals have undergone some remarkable transformations in the past 20 months. Resulting from the cutbacks announced in May 1959, it was anticipated that the excess of available new supply of lead metal (which had been estimated at 150,000 tonnes for 1959) would decrease to an annual rate of 59,000 tonnes in the second half of 1959. For zinc metal the decrease, similarly calculated, would be from 120,000 tonnes to an annual rate of 16,000 tonnes. At its second meeting, early in 1960, the Group foresaw the possibility that during 1960 consumption of zinc might exceed current production by some 75,000 tonnes. In the case of lead, however, it was then estimated that production would exceed consumption by about 100,000 tonnes, but that the excess would be reduced to an annual rate of 50,000 tonnes by limiting the tonnage put on the market, which the producers were prepared to continue doing.

In September last year, the Study Group predicted a zinc surplus of 74,000 tonnes instead of the deficit forecast at the previous meeting and envisaged a statistical surplus of 102,000 tonnes for 1961. However, it was concluded that no further action was warranted. In the case of lead, the balance between new supplies and demand was reported in September to show a statistical surplus of 21,000 tonnes for 1960 and 26,000 tonnes for 1961.

Due to the absence of up-to-date world statistics, the current relationship between production and demand cannot be precisely assessed for either metal. It would appear, however, that over 1960 as a whole, zinc may well prove to have been broadly in balance, due in part to lower U.S. production in recent months and in part to sharp increases in demand in the Far East, where Japan has become a major importer of U.S. metal. Now that the possibility of a price war in the United States has apparently disappeared, the market has become steadier. A slight slackening in European consumption has become apparent, while there are growing indications that the recession in the motor industry might be prolonged. It seems possible, therefore, that the Study Group, at its meeting in March, will recommend the reimposition of voluntary controls on exports. Some of the leading producers, however, are believed to be opposed to such a step, more especially since the source of zinc's weakness is the United States, where prospects for economic recovery are now being more hopefully assessed. Meanwhile, present difficulties may result in renewed pleas from U.S. lead and zinc producers for additional protection to which, however, the new Administration hardly seems likely to lend a more sympathetic ear than its predecessor.

World consumption of lead was well maintained last year; nevertheless, refined stocks held by producers are thought to have increased by at least 75,000 tons during the year. To the present, lead-zinc mines have been reluctant to cut output of lead for fear of creating a shortage of zinc, hence the benefits of reducing supplies to the market have, to some extent, been offset by the rising level of producers' stocks. Now that zinc's market position has also weakened, this reason for objecting to output cuts has become less cogent.

Consolidated Mining and Smelting of Canada has just announced a 20 per cent cutback in lead production, but

their example has not as yet been followed. To prevent lead's statistical position from deteriorating further during the current year, the Study Group at its March meeting may well find it expedient to recommend cuts on output as well as supplies, and on a wider scale.

An unsatisfactory aspect of the existing voluntary restrictions on commercial offerings is that so far Australia and Canada have done more than their share to support the market, whereas the declarations made by some other member countries have been vague and hedged with conditions and in some instances the steps taken to give effect to them remain a matter for conjecture. While the Study Group can only make recommendations, it is to be hoped that some more precise and effective arrangement for curtailing the availability of lead and spreading the burden more widely will emerge from its March meeting.

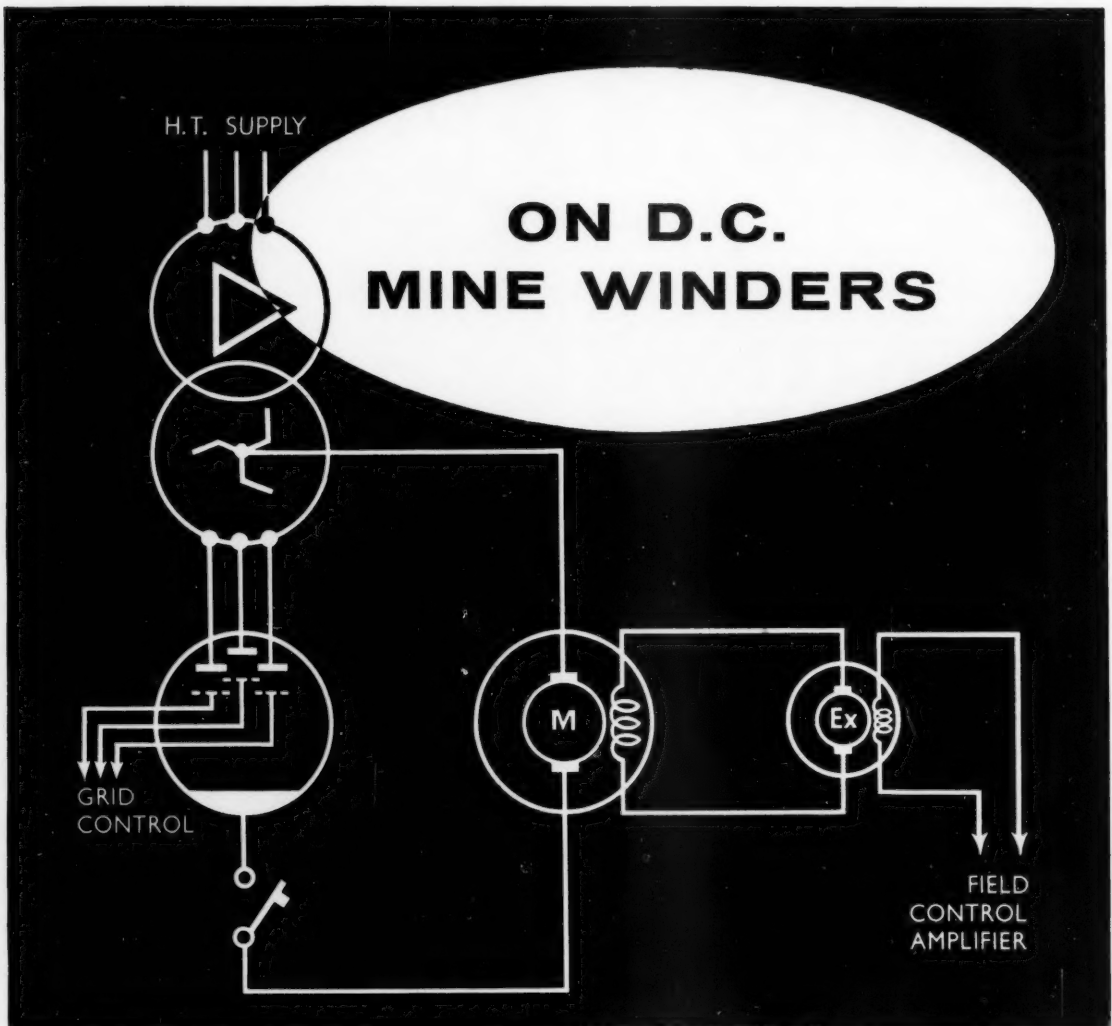
In the light of past experience, it would appear that one of the Group's most urgent requirements is a reliable information service, which will permit the more accurate assessment of world trends. The Study Group cannot in fairness be blamed for failing to forget the recession in the United States, which few economists predicted. The fact remains that, so far, it has sung such a different statistical tune after every meeting that its pronouncements can no longer be accepted with complete confidence. One defect in its intelligence system is that its estimates are apparently based on figures provided by member governments rather than those available from trade sources. The present disposition of the Lead and Zinc Study Group, it has been stated, is to rely upon existing sources of statistics as far as possible, but to exert an influence toward improvement and extension of existing statistical work. The latter aim, one trusts, is not being overlooked.

Curtailement of supplies is, at best, a temporary palliative for over-production. In the long-term, the problem of over-supply can only be solved by the expansion of consumption. Lead has lost ground to competitive materials in recent years and no major outlet has been discovered. Its rate of growth has accordingly lagged well behind that of aluminium and plastics and also behind that of zinc. This has probably been due in no small measure, at any rate in the past, to the absence of a dynamic approach to research and sales promotion. Zinc, though also confronted with a formidable challenge from newer materials, adopted a more vigorous approach to the struggle for markets. The industry has proved outstandingly successful in the promotion of international co-operation in the various fields of zinc usage, which has been reflected in the growth of world demand.

AUSTRALIAN RESTRICTIONS ON IRON ORE EXPORTS

As last reported in our issue of November 18, 1960, p. 560, the Commonwealth Government has been under growing pressure to remove or modify the long-standing embargo on the export of iron ore. Since 1938, when the embargo was first imposed, Australia's known reserves of high grade ore (60 per cent or over) have risen from 268,000,000 tons to an estimated 368,000,000 tons, while there are also large tonnages of lower grade ore of potential commercial importance at a future date.

Australian consumption, currently at the rate of 4,000,000 t.p.a., is expected to reach 7,700,000 t.p.a. by 1970. Even at the present figure the established reserves of high-grade ore can scarcely be regarded as abundant in relation to future needs. On the other hand, the reserves have risen by about 100,000,000 tons in the past 22 years, despite the extraction of 50,000,000 tons during that period,



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and it can reasonably be assumed that further discoveries will continue to be made, provided that there is sufficient incentive to encourage exploration.

In the circumstances the decision of the Australian Government to permit limited exports of iron ore can have occasioned little surprise. The primary consideration remains the conservation of resources for the country's own use. Hence exports are still totally prohibited from certain named deposits, which include nearly all the proved reserves. In general, however, exports of iron ore from individual deposits are limited to 50 per cent of the total. At the other end of the scale, ore extracted from small deposits can be exported in full.

The Australian Government's intention is to keep a limitation on the total amount to be exported, the annual rate of export, and the period of time during which exports will be permitted in respect of each deposit. "Unless we do so," said the Minister, "we may find ourselves in the position of having allowed exports from existing deposits or new discoveries, which later proved to be large enough to justify the expectation that they might be used to better national advantage by our own local steel industry or by being used in the manufacture of pig iron or sponge iron. The greater the extent to which iron ore is processed within Australia, the more employment we provide and the greater the export income we earn".

The Government hopes that the incentive afforded by the authorization of limited exports will be sufficient to encourage exploration, while ensuring that a reasonable proportion of new resources is conserved for use in Australia.

TINPLATE FIGHTS BACK

In the light of the statistics published by the International Tin Council in its *Statistical Bulletin* for December, it becomes increasingly apparent that, in the absence of any major recession, tin prices will strengthen in 1961 (*vide The Mining Journal*, Jan. 13, 1961, p. 37). World mine production of tin-in-concentrates is provisionally estimated at 158,500 t.ons (excluding production in the U.S.S.R. but including a notional estimate of 24,000 tons for Mainland China). On the basis of the available figures, it seems probable that, for 1960 as a whole, world output of tin metal (excluding the U.S.S.R.) exceeded world mine production by over 10,000 tons, reflecting the marked drawing down of stocks of tin in producing countries during the year. On the assumption that consumption in Federal Germany continued in the fourth quarter of 1960 at the very high rate reported for the third quarter (over 2,500 tons a month), it is tentatively estimated that in 1960 world consumption reached approximately 184,000 tons.

Seasonal considerations apart, the recent easing of tin prices on the L.M.E. appears to have stemmed from the sharp fall in U.S. consumption during the last quarter of 1960, coupled with the curtailment of tinplate production by the Steel Company of Wales. U.S. consumption in the final quarter amounted to some 9,000 t.ons, compared with 14,500, 15,500 and 13,050 tons in the first three quarters respectively. Can manufacturers in the United States are reported, however, to have placed a number of orders for tinplate for January shipment. Though no major upsurge in demand is expected much before April, it is considered that the abnormally low level of tinplate inventories should result in at least some seasonable rebuilding during the first quarter. As to the medium term outlook, it is now generally expected that U.S. tinplate shipments during 1961 will exceed the 1960 total by at

least a small margin, such predictions being based to some extent on the assumptions that 1960 food packs were smaller than normal and that better weather in 1961 will encourage the sale of beer and soft drinks.

Of more long-term significance for tin producers is the success of "Ferrolite", the very lightweight tinplate introduced by the U.S. Steel Corporation, for which demand is described as being much greater than supply. Moreover, rumour has it that two or three other tinplate producers have started to ship a similar product in sufficient quantities for pilot runs. Tinplate's competitive position vis-à-vis aluminium has also been improved by certain minor revisions in the prices of established light weight grades.

Yet another bull point is afforded by a recent report in *American Metal Market* that tinplate appeared to have captured a "good-sized" market in the telephone business, and also appeared to be recapturing a large part of the can market which had been lost to aluminium. The Jones and Laughlin Steel Corporation has revealed that it is supplying tinplate to the Western Electric Co., manufacturing unit of the Bell Telephone system, for a new-type cable known as "Stalpeth" which, it is claimed, is made at lower cost than the lead-sheathed cable it replaces. Several other companies are also reported to be furnishing tinplate for this new use and estimates of the potential demand range as high as "several thousand tons a year".

It has been further reported that two large oil companies in the U.S. have switched back from aluminium to tinplate for oil cans because there were too many "leakers" among the aluminium cans, which, it is alleged, had the further disadvantage of denting too easily, especially when being lithographed.

In view of the more encouraging outlook for the U.S. tinplate industry, coupled with growing confidence that an upturn in the American economy will not be long delayed, it becomes increasingly unlikely that tin's statistical strength will be weakened by any serious contraction in world consumption.

125 YEARS OF BANKING

This year the Westminster Bank will celebrate its 125th anniversary. It is in the past twenty-five years that the biggest and most rapid changes in its long history have taken place. An indication of the quite remarkable progress achieved during this challenging period is given by the chairman, The Rt. Hon. Lord Aldenham, in his annual statement to shareholders (see page 112).

At the end of 1935 the total of the bank's Current Deposit and Other Accounts amounted to £323,000,000 and Advances and Other Accounts to £115,000,000. At the end of last year these figures had risen to £1,009,000,000 and £459,000,000 respectively and for the first time the bank has been able to publish a deposit figure of over £1,000,000,000. Last year 100,000 new current accounts were added. The number of branches has risen from 1,089 in 1935 to 1,225 at the present day, but in this connection the chairman recalls that during the war many branches were closed by mutual agreement between the clearing banks, so that by August, 1945, the number had fallen to 975.

After 125 years of service Westminster remains in the vanguard. It has pioneered the drive-in bank in Britain. It has been among the leaders of progress in mechanized banking and is now on the threshold of far-reaching electronic developments. These and other changes are continually enabling the bank to increase the scope and efficiency of its operations.

Chromite Production in Southern Rhodesia

THE first shipment of chrome ore from Southern Rhodesia took place in 1906, and the source, the Selukwe chrome field, gradually gained recognition during the ensuing decade as the principal supplier of high grade metallurgical ore to the world's consuming industry. The ore was high grade metallurgical for which there was an eager market in Europe and according to a metal map issued by the Imperial Institute during that era, Southern Rhodesia held the premier position for chrome production in the British Empire.

Intensive prospecting of the North Great Dyke in the Lomagundi area, which was now served by a rail link, resulted in the first shipment of 900 tons from this new chrome source in 1919. Production from this area rose steadily to reach 36,000 tons for the year 1928. However, by this time, Selukwe was firmly established as the major producer and accounted for approximately 60 per cent of the total production for 1928, at 219,248 tons.

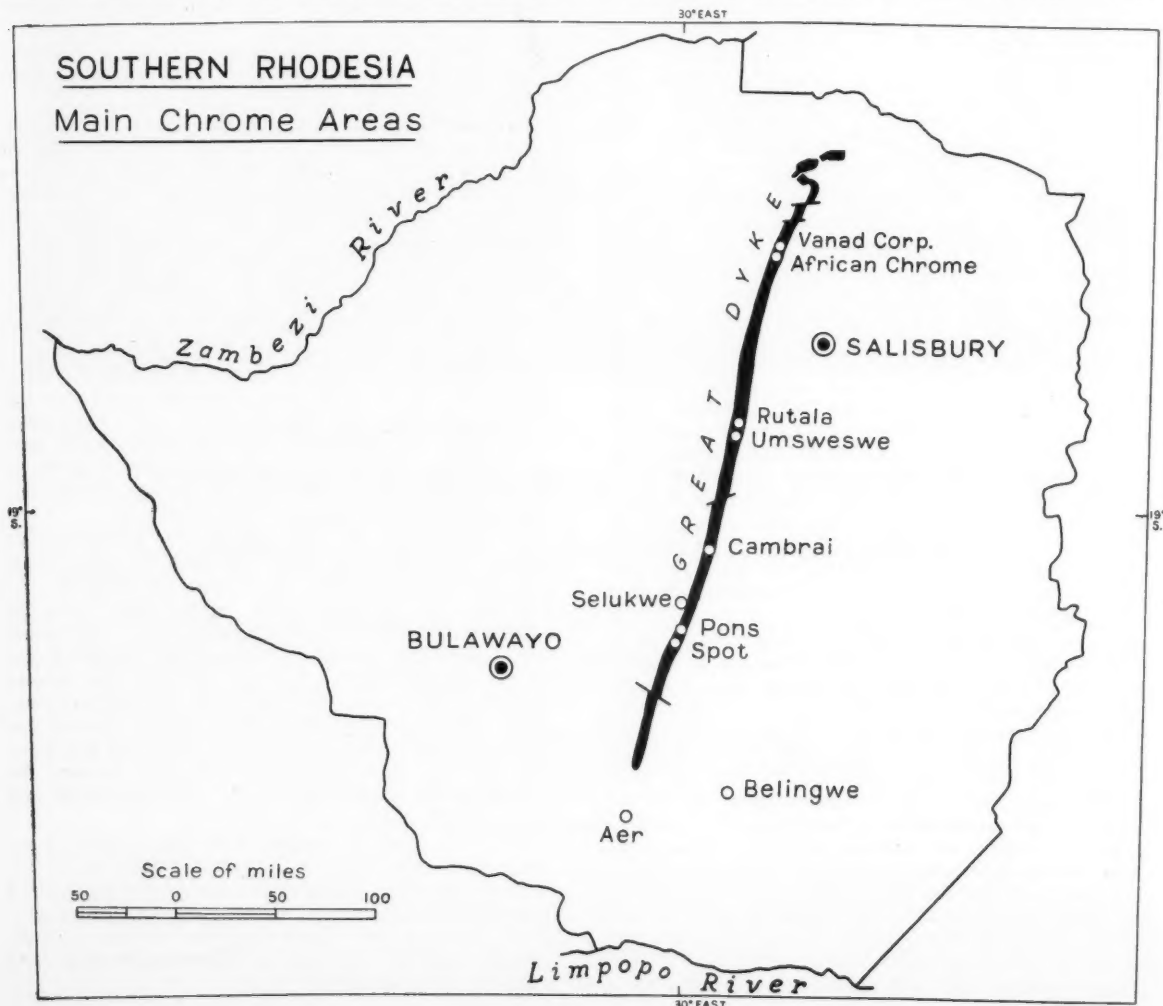
Chrome production in Southern Rhodesia rose steadily in the ensuing years excepting for the set-back suffered during the world wide depression years, 1931 to 1934, and reached a record of 654,000 tons produced in 1957. By 1959, a grand total of 11,407,246 s.tons of chrome ore had been extracted from the vast resources of Southern

The source of this article is "Chromium in Southern Rhodesia", an illustrated brochure compiled by R. Stanley, Minerals Information Officer, Mines Department, Southern Rhodesia Government. We are indebted to the Mines Department for the map and photograph here reproduced

Rhodesia since the industry started in 1906. Of this tonnage, 6,459,525 tons or 57 per cent came from the abundant reserves of the Selukwe deposits.

Being a land-locked country with only one rail link to the sea at Beira up until 1956, production of chrome was always limited by transport capacity and falls far short of the actual potential throughout the years 1908 to 1956. Chrome had also to compete for railway transport with traffics earning higher transportation revenue such as copper, asbestos and agricultural products which came with the economic growth of the country.

Since 1953, the railway haulage capacity in Southern Rhodesia has been gradually improved, and with completion of a new railway from Bannockburn to Lourenço Marques in Portuguese East Africa in 1956, coupled with expansion of rolling stock, the railway bottleneck for



chrome exports has been completely eliminated. Today the industry and the railway system are geared to produce and export well over 1,000,000 tons per annum or practically double the present rate of sales.

Nature of Deposits

The chromite occurrences are classified into three separate and distinct groups, namely:—

- (a) Massive lenticular bodies (Selukwe, Belingwe, Mashaba and Gwanda).
- (b) Parallel seams (Great Dyke).
- (c) Eluvial Deposits (Great Dyke).

Massive lenticular bodies occur at the following sites.

(a) *Selukwe*. The large ore bodies lenticular in shape and dipping almost vertical occur in serpentine country rock. The serpentines are in various stages of alteration to talc-schist, talc-carbonate rock, carbonate rock and chert. These ore bodies constitute the foundation of the chrome industry of Southern Rhodesia and, up and until fairly recently, accounted for more than 50 per cent of the total annual production. These deposits have since 1907 been exclusively worked by the Rhodesia Chrome Mines Ltd., a wholly owned subsidiary of Union Carbide Corporation, and have produced a total of 6,459,525 tons of chromite in the period 1905 to 1959. This production represents 56.6 per cent of the total chromite production of Southern Rhodesia since the inception of the industry and comprised mainly high grade metallurgical ore. Considerable reserves of chemical and refractory ore also exist in the Selukwe deposits and production of all grades at the present rate of over 250,000 tons per annum can no doubt be maintained for many years to come. It is estimated by the Geological Survey that more than half of the original reserves have been depleted in which case the remaining reserves may be conservatively estimated at 5,000,000 tons.

(b) *Mashaba*. The occurrence of chrome ore at Mashaba is very similar to the Selukwe deposits, but only on a much smaller scale. The main producer is the Prince Mine owned by the Rhodesia Chrome Mines Ltd. and the rate of production is approximately 1,000 tons per month. These deposits have been worked since 1927 and had produced 200,272 tons up to the end of 1959. The reserves are not accurately determined, but it is estimated that over 1,000,000 tons remain to be extracted.

(c) *Belingwe*. These deposits constitute a new discovery having only been discovered in the 1950's and brought into production in 1957. The deposits occur in isolated inclusions of ultramafic rocks in granite country. The chrome ore bodies occur in steeply dipping inclusions isolated from one another, irregular and lenticular, and analogous to the location of plums in a plum pudding.

The world market recession which followed the discovery of these new deposits restricted vigorous exploration. Consequently, underground exposures are limited and the extent of ore reserves unknown. Furthermore, considerable tonnages are available at or near surface so that it will be a long time ahead before the bodies are probed to any extent at depth. However, from a geological point of view, they are considered to comprise abundant future reserves. A conservative estimate is given as over 2,000,000 tons available from a shallow depth at a low mining cost.

The principal producing mines in this area are the Mapanzuri Chrome Mines (Pvt) Ltd., Mlomo Chrome Mine (Pvt.) Ltd., Inyala Chrome Mines (Pvt.) Ltd. and the Eureka Chrome Mine. These mines are conveniently served by the new railway outlet to Lourenço Marques port and current production fluctuates between 2,000 and



View of the Rhodesia Chrome Mines Ltd's. Peak mine at Selukwe

4,000 tons per month, depending on the market demand. All grades of ore are available and this area should gain importance as a producer of some magnitude in the future when the market demand improves. The metallurgical grade ore is particularly notable for its high chrome oxide content which appears to average between 52 and 53 per cent although the chrome to iron ratio does not usually exceed 2.8 to 1. A good refractory ore is available having a silica content under 5 per cent and FeO in the vicinity of 16 per cent. There would appear to be no reason why the current output potential of this area should not be set down at 120,000 tons per annum based on present mine installations. As far as railway transport is concerned, the new line to Lourenço Marques port is operating well below capacity and the railway authorities have intimated that greatly expanded chrome exports from Belingwe would be welcomed.

(d) *Gwanda*. According to the Geological Survey, the Belingwe chrome belt persists discontinuously to the west into Gwanda district where the Aer mine has been producing refractory ore for some years. Here again the ore bodies are contained in a small schist inclusion in granite country, and production is at the rate of between 300 and 400 tons per month. The refractory ore is mainly exported to the Union of South Africa to be used in magnesite/chrome refractory brick manufacture. Discoveries of chrome ore have been reported about 25 miles south of Gwanda but, so far, very little is known of the potentialities.

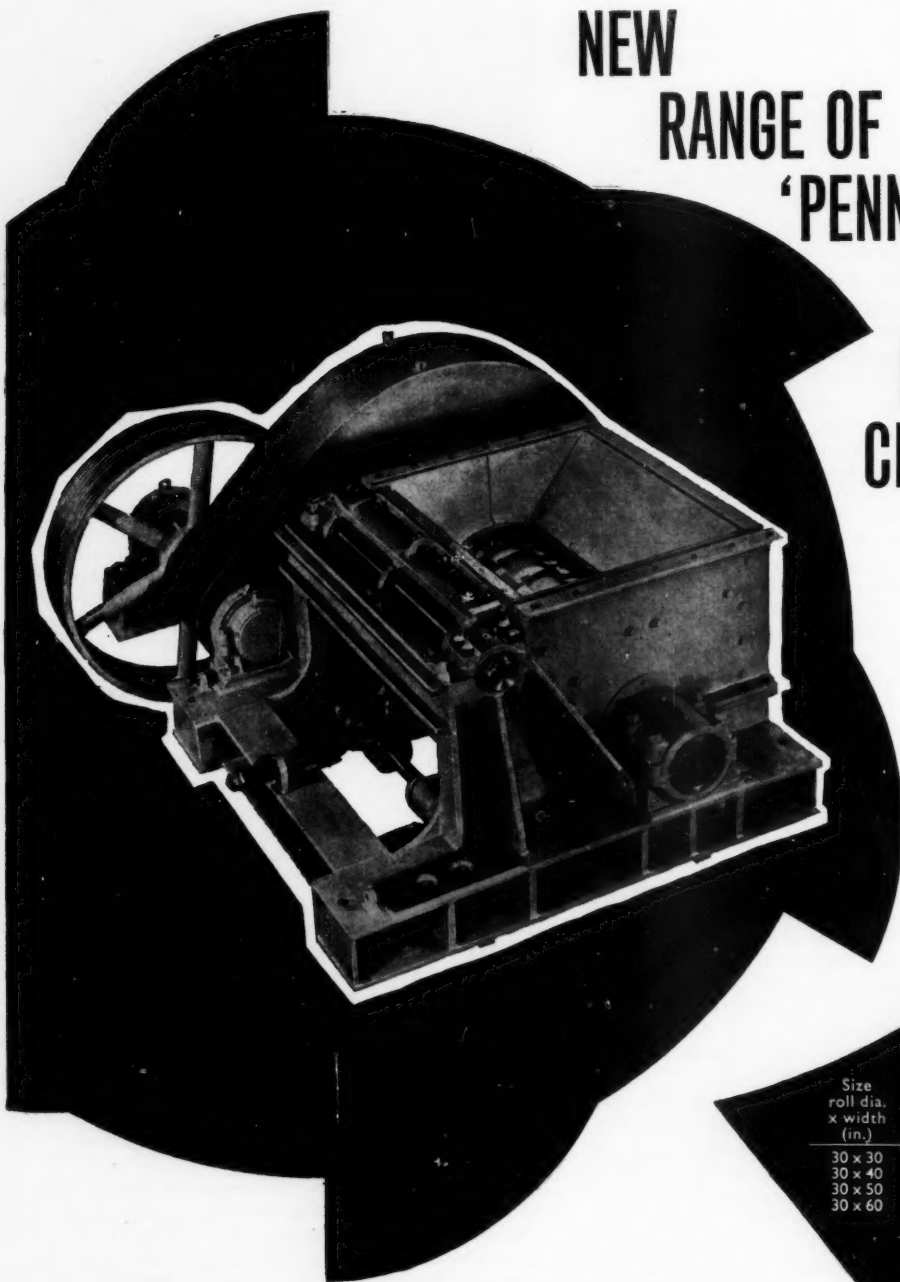
The Great Dyke

The parallel seam type of chrome ore deposit occurs in the Great Dyke, an elongated mass of ultra-mafic rocks which lies in an almost straight line trending 17 deg. east of north and extending over a distance of 335 miles through Southern Rhodesia. The Dyke is intrusive into the Archaean Granite and for only 10.5 miles of its total length is it in contact with rocks other than granite. The chromite mineralization occurs in the four composite complexes in the Dyke, each complex having a remarkably regular layered structure. These four complexes as they occur in the Dyke from north to south have been named and determined in extent as follows:—

Complex	length (miles)
Musengezi	30
Hartley	195
Selukwe	60
Wedza	50

The Selukwe complex is not to be confused with the Selukwe chrome deposit in the Basement complex. The four complexes are essentially similar in structure and

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30 x 60	36	400-500	250

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component rock types, and exhibit a marked layering and rhythmically repeated zoning of the component rocks. The dip of the layering is inward (synclinal), being steeper at the margins than towards the centre. The succession in individual magma inflows is normally from dunite through harzburgite to pyroxenite.

Each seam is fairly consistent in chemical composition throughout its occurrence in the succession in each complex. Invariably the seams below No. 3 seam are of metallurgical grade analyzing an average of plus 48 per cent Cr_2O_3 (chromic oxide) and a chromium to iron ratio of plus 2.8 to 1. When these seams are subjected to beneficiation involving crushing and concentration, the chromic oxide content can be raised to 52 per cent Cr_2O_3 . The product in this case would be in the form of concentrates. In general, these seams are exported without any surface treatment and only in cases of below grade analysis is it necessary to crush and concentrate to improve the Cr_2O_3 content.

These lower seams are usually narrow in width compared with the upper seams and average between 2 and 6 in. The upper seams vary from 8 to 18 in. in thickness and are usually of chemical grade. It is usual for the mined ore from these seams to be crushed and concentrated before export. The concentrates produced from these seams usually have a chrome to iron ratio of 2.3 to 1 and a chromic oxide content of 49 per cent. The chrome seams in the Great Dyke vary from friable to hard-lumpy in character along their strike. More than 40 per cent of the chrome ore produced is of the friable type.

Mining Methods and Reserves

The extraction of chromite seams has not presented any mining problems in the Great Dyke. The outcrops of the various seams occur over distances measured in miles and consequently the main mining method practised until fairly recently has comprised "pig-rooting" or surface working whereby the seams dipping in the range of 15 deg. to 25 deg. are extracted to a shallow depth seldom exceeding 10 ft. below surface. This method is still in practice today by some producers, although the long-established mines are operating underground at varying depths measured along the dip of the seams from a few hundred feet to over 1,000 ft.

Nevertheless, even in the case of the oldest established producer on the Great Dyke now operating at a considerable depth, some 20 per cent of production is still obtained from the surface working of seam outcrops. Hence the statement by the Geological Survey, in a survey of mining operations in the Great Dyke, that up to the present these operations have "only scratched the surface" of the vast chromite reserves.

The Great Dyke constitutes the major reserve of chromite in Southern Rhodesia. Owing to the regularity and consistency of the seams of chromite, it has never really been necessary for mines to accurately assess their ore reserves as the life of the mine would appear unlimited on prevailing rate of production to satisfy market demand. Their main concern has always been to locate additional markets which would allow for expanded production.

To illustrate the abundant ore reserves more clearly, one has only to consider the extent of the chromite bearing rock of the Great Dyke which is 1,250 sq. m. The calculated ore to be recovered from one seam dipping 25 deg., allowing for mining, handling and transport losses at 10 per cent, in an area of one square mile is 1,900,000 tons. Seldom, however, are less than three seams present in any section of the Dyke and thus a conservative esti-

mate of the ore in one square mile would be 5,700,000 tons. On this basis the Dyke should contain $1,250 \times 5.7 = 71,250,000,000$ tons of chromite of which 40 per cent is estimated to be of metallurgical grade and 60 per cent, chemical/refractory grade.

In assessing ore reserves, however, one has to take into consideration economic factors to determine whether the ore, irrespective of grade, can be profitably extracted. In the case of the Great Dyke deposits, depth of mining operations would be a limiting factor from the economic point of view depending on the market price of the ore to be produced. There is one mine operating seams at a vertical depth below surface exceeding 1,750 ft. However, although the seams are known to persist to great depths measured in thousands of feet vertically below surface, the Great Dyke ore reserve calculation which follows is based on the chrome ore content of those seams which outcrop to a vertical depth of under 500 ft. below surface, or, an inclined depth of 1,000 ft. measured from the outcrop along the dip of the seams.

The table of Great Dyke ore reserves which follows has been calculated from statistics obtained from the Geological Survey which are based on their detailed investigations of the entire Great Dyke deposits during the past few years.

Calculated content of outcropping seams down to a depth not exceeding 500 ft. vertically below surface (in 000,000 s.tons):

Metallurgical	...	...	...	...	189.315
Chemical/Refractory	...	...	...	...	354.453
Total all Grades	...	...	...	...	543.768

The non-outcropping seams which are known to exist at depth have not been taken into account in the calculation. The major portion of production from the Great Dyke comes from the Northern Section which is served by a railway terminating at Kildonan. An extension of the railway line from Kildonan northwards up to Mt. Mtorshanga would considerably benefit major producers in reducing costs, and such a project is now under consideration. The northern portion of the Great Dyke is the principal metallurgical ore producing area.

Eluvial Deposits

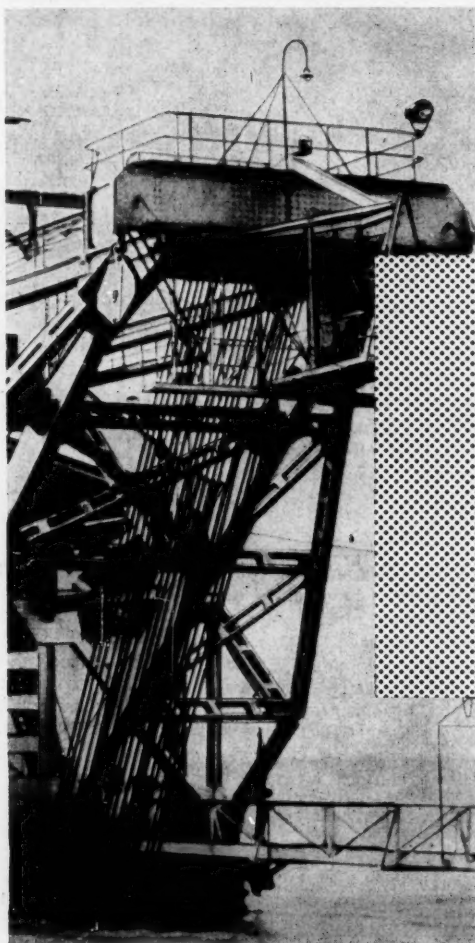
The chromite in the Great Dyke is not only confined to the eleven chromite seams, but also occurs as isolated grains in the host country rock. Surface decomposition of these rock types by weathering and other agents has resulted in the heavier grains being concentrated in the soil along the margins or in the transverse valleys or along watercourses.

The country rock is analyzed to contain up to 3 per cent chromite by volume and the concentration of this mineral in the soils of the Dyke range from 3 per cent to 35 per cent of the soil. The soil cover along the margins of the Dyke and in the valleys varies from 2 in. to 2 ft., 18 in. being a good average depth. Chemical analyses of the eluvial chromite indicate a different alumina and magnesia content and chrome to iron ratio to that of the seams which outcrop in the vicinity. The chromite is also much finer grained (about 3 m.m.) than that of the seams.

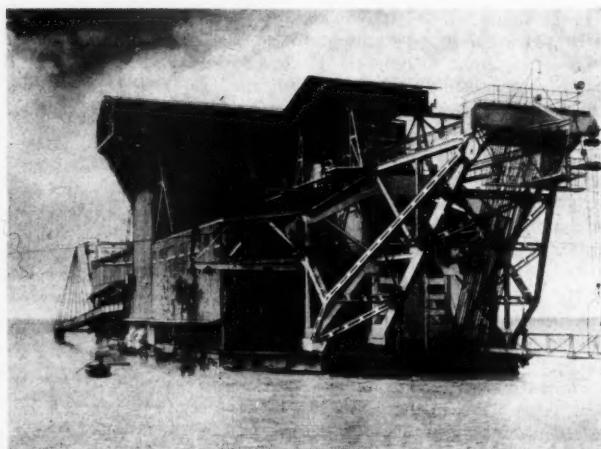
Owing to the fine grained size of the chromite, the ore is recovered from the soil by flotation methods in the form of a concentrate which is further purified by introducing an electromagnet in the flow sheet of the plant. The final product ranges in grade from 53 to 55 per cent Cr_2O_3 and 2.3 to 2.5:1 chrome to iron ratio with an exceptionally low silica content of about 2 per cent SiO_2 .



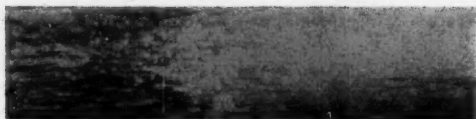
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Several of these deposits are being successfully operated on a fair scale with one producer recording over 40,000 tons for 1959. This producer, Rhodesian Mining Enterprises (Pvt.) Ltd. pioneered eluvial chromite recovery by flotation, which has been followed by African Chrome Mines Ltd., a wholly owned subsidiary of the Union Carbide Corporation, installing a plant capable of producing over 2,000 tons of eluvial chromite per month. The Rhodesia Cambrai Mines (Pvt.) Ltd., operating in the Central Dyke area, is also planning the installation of a chrome from soil extraction plant.

It is estimated that the eluvial chromite bearing areas cover some 200 sq. miles. One acre of chrome bearing soil, 18 in. deep, containing 15 per cent chromite is estimated to yield 490 tons of concentrate if extraction is nearly 100 per cent. On this basis, an approximate estimate of the ore reserves would be 62,720,000 tons of rich concentrates (20 cu. ft. soil=1 t. ton).

The table above gives estimated ore reserves in millions of tons:

Selukwe	...	...	...	...	...	...	5
Mashaba	...	...	...	...	...	...	1
Belingwe	...	...	...	...	...	...	2
Great Dyke	...	...	...	...	...	...	540
Eluvial	...	...	...	...	...	...	60
Total	...	...	...	...	...	...	608

The grades of ore produced are not individually confined, and Great Dyke, Belingwe, Selukwe each may produce a variety of grades. It is estimated that 50 per cent of the reserves are of chemical/refractory grade and 50 per cent metallurgical grade ore.

The highest annual world production during the period 1954-58 was 5,200,000 s.tons in 1957. The highest annual production recorded so far in Southern Rhodesia was 650,000 s.tons in 1957.

The current rate of depletion of the reserves in Southern Rhodesia is so small a fraction of the calculated 608,000,000 s.tons, which is by no means the limit of the resources, that the estimated life of the industry may be described as unlimited.

Mineral Developments in Brazil

(from our own Correspondent)

ON December 1, 1960 Fertilisantes de Minas Gerais S.A. (FERTISA) started producing 150 tons of superphosphates daily. FERTISA was founded in 1953 with mixed state and private capital to exploit important apatite deposits at Barreiro de Araxa, Minas Gerais, with measured reserves of 90,000,000 tonnes of phosphoric rock containing 20-35 per cent P_2O_5 .

Industrial exploitation of a deposit of niobium in the same area will start in February, 1961. Prospecting, financed by FERTISA, the concessionaire, yielded the following results: 185,300,000 tonnes of ore with an average content of 2.5 per cent Nb_2O_5 , or 9,286,650 tonnes of pyrochlore with over 56 per cent Nb_2O_5 ; 130,000 tonnes of ThO_2 ; 84,000 tonnes of U_3O_8 . Inferred reserves in 1958, over 370,000,000 tonnes. The deposit is claimed to be the world's biggest known single reserve of columbium and thorium.

Manganese Exports

Industria e Comercio de Minerio (ICOMI), associated with Bethlehem Steel Corp., has obtained a loan of U.S.\$67,500,000 from Eximbank to improve the installations of the Serra do Navio manganese mines, the minerals railway and port at Sant'Ana, near Macapa in the Amapa Territory. ICOMI has recently raised its capital from 200,000,000 to 400,000,000 cruzeiros. The shareholders are Cia. Auxiliar de Minerais (Antunes group), 51 per cent, Bethlehem Brazilian Corp., subsidiary of Bethlehem Steel Export Corp., 49 per cent.

United States Steel, which held a concession to exploit the manganese deposits at Lafaiete, Minas Gerais, has relinquished its rights to export the product of the mine and in October, 1959, started shipping manganese from the deposits at Urucum, Mato Grosso, exploited by

Sociedade Brasileira de Siderurgia S.A. (Chamma Brothers); according to the present arrangements U.S. Steel does not participate in the company, but has a priority claim on the output of the mines. It has invested U.S.\$3,500,000 in the purchase of lighters to carry the ore from Corumba, in Mato Grosso, over the Paraguay River, not always navigable to deeper draught vessels, to Rosario, in Argentina. From Rosario the ore is shipped to U.S.A. by ocean-going steamers. The output of the Lafaiete mine is now reserved for national consumption, as the reserves were being rapidly depleted by exports.

Iron and Steel

Cia. Meridional de Mineracao, subsidiary of United States Steel, is installing plant at Lafaiete to produce ferro-alloys. Three other plants are now operating, namely Cia. Siderurgica Nacional (the national steeworks), also at Lafaiete; Cia. Niquel do Brasil, at Liberdade, in Minas Gerais, and Cia. Alumínio, at Saramenho.

The Brazilian Bank for Economic Development has advanced 200,000,000 cruzeiros to the Rio de Janeiro authorities to lengthen, and improve the installations of, the mineral quays. By December, 1961, these must be able to load 6,000,000 tonnes of iron ore, at the rate of 1,000 tonnes per hour, and discharge 1,000,000 tonnes of coal at 700 tonnes per hour.

Representatives of the German firms Krupp and Renstahl have submitted a proposal to the Rio Grande do Sul Government to exploit iron mines in the Sarandi and Nonoai regions of that State. The government awaits the results of prospecting by the mineral department.

Petrobras, drilling for oil in Sergipe, has discovered large deposits of high-grade rock salt near Mosqueiro and Porto Dantas.

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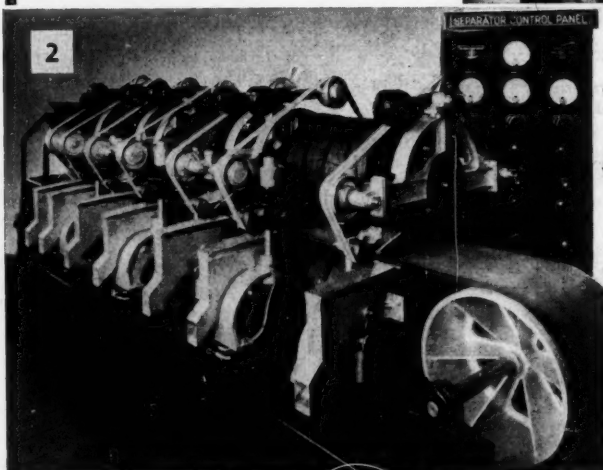
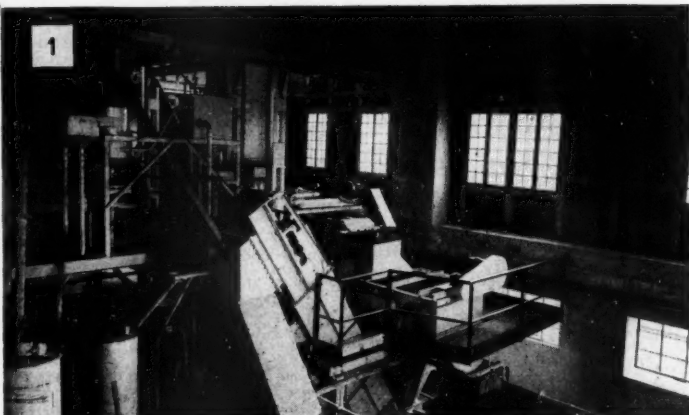
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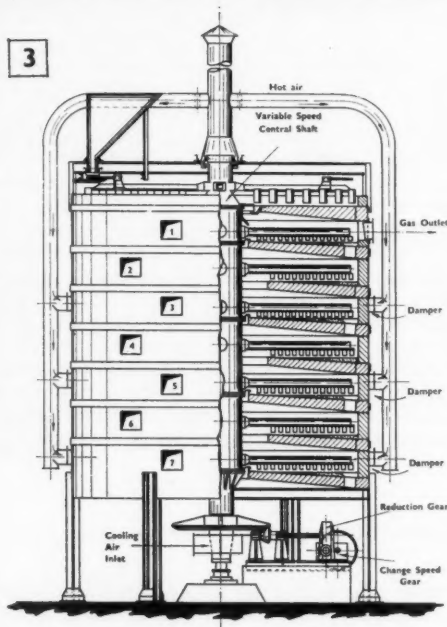
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Iron Making—II

Smelting Special Ores

LOW grade siliceous ores require very large limestone additions to the blast furnace with consequent high coke rate and low productivity. The **Krupp-Renn** process was designed to smelt such ores and has been used successfully with ores where the iron content was around 30-35 per cent and the silica up to 40 per cent. However, a serious disadvantage of the process is the high sulphur content of the metal produced which renders it unsuitable for direct use for steel making so that it is normally charged to the blast furnace. Thus, in one sense, the Krupp-Renn process can be considered as beneficiation rather than smelting.

The opening up of a large number of low grade ore deposits, e.g. in Canada, the ore from which must be concentrated and agglomerated before charging to the blast furnace, has revived interest in a combined beneficiation-reduction process. The use of such a low-temperature kiln process as the **R-N** for low-grade hematite deposits would have a number of advantages: initially only coarse grinding (to about $-\frac{1}{2}$ in.) would be necessary; reduction rate would be likely to be rapid; fine grinding after reduction would be relatively simple; iron recovery would probably be higher than that obtained by gravity or flotation treatment; the final sponge iron briquette should be suitable for steel making.

Titaniferous ores: These ores are considered to be unsuitable for use in the blast furnace. With an electric furnace of the Tysland-Hole type, however, it is possible to control furnace operation so that such ores can be smelted without undue difficulty and without a high titanium content in the metal. In Canada ilmenite is being smelted commercially to make pig iron and a titania-rich slag. Processes where a kiln reduction stage precedes electric furnace smelting can also be used for treating titaniferous ores, and the **Strategic-Udy** process has been successfully used on a pilot scale to smelt ores with TiO_2 contents up to 25 per cent.

A low temperature kiln reduction process—such as the **R-N**—should also be suitable for use with titaniferous ores, provided that it is possible to separate the TiO_2 containing gangue from the reduced iron.

Low grade manganese ores: For the manufacture of ferro-manganese in the blast furnace, high grade manganese ores are necessary with a high Mn/Fe ratio. There are, however, many deposits of low grade ore with too low a Mn/Fe ratio for blast furnace use. By a low temperature kiln reduction process such as the **R-N** the bulk of the iron oxide can be reduced to metal whilst the manganese remains as MnO . Thus these metals can be separated in the grinding/magnetic separation stage. By this means a briquette suitable for normal steel making and a slag from which manganese could be extracted by electric furnace smelting are formed.

Controlled electric furnace smelting—preceded, if desired, by pre-reduction in a kiln—also offers the possibility of producing a basic iron in the first stage of reduction and a ferro-manganese in the second. Pilot plant trials with the **S.U.** process have shown that it is possible to make a basic iron and ferro-manganese from an ore with only 15 per cent Mn and 22 per cent Fe. It is also possible to extract manganese from ferro-manganese blast furnace slags by controlled electric furnace smelting.

Zinc containing ores: Zinc causes a great deal of trouble in the blast furnace and so ores with anything

This is the second and concluding instalment of an article in which alternative iron making processes are surveyed by a special correspondent

more than a very small zinc content cannot be used. In Germany the **Sturzelberg** process has been developed to smelt ores containing about 42 per cent Fe, 10 per cent Zn and 7 per cent S. The ore is first calcined to remove the sulphur and then charged with lime and a coke breeze into a short rotating reverberatory furnace fired by a pulverized fuel burner. Zinc is volatilized off and condensed from the waste gas. When reduction is complete the iron, of high purity, is tapped by tilting the furnace.

Slags from non-ferrous smelting operations: There are very large quantities of copper slag available containing 30-40 per cent iron. Because of the chemical state of the iron and the non-ferrous metal content, these slags are unsuitable for use in the blast furnace. They can be smelted, however, in an electric furnace and the process becomes more attractive if the small quantities of residual copper and zinc are recovered. A plant to smelt such slags is being constructed in Arizona. It is a modification of the **Strategic-Udy** process.

Ores containing nickel and chromium: Laterites, which invariably contain small amounts of Ni and Cr can only be used in relatively small quantities in the blast furnace for the production of basic iron. They can, however, be smelted in an electric furnace and used for the manufacture of ferro-alloys. For example, in New Caledonia such ores are reduced in a Tysland-Hole type furnace and a metal is produced containing all the nickel and chromium and appreciable carbon and silicon. Subsequent blowing in a converter oxidizes all the elements other than iron and nickel and a ferro-nickel is produced with around 25 per cent Ni. A somewhat different method is adopted for producing ferro-nickel from the low grade ($1\frac{1}{2}$ per cent Ni, 8-15 per cent Fe) ores of Oregon. Here the ore is melted in an electric furnace and reduced in a ladle by controlled addition of ferro-silicon by the **Ugine** process to give a ferro-nickel of around 45 per cent Ni.

Electric furnace smelting—particularly the use of a process employing resistance heating in the slag layer—makes it possible to exercise a much greater control over metal composition than is possible in the blast furnace. This opens up interesting possibilities, for example the **Strategic-Udy** process has been used, on a pilot plant scale, to produce a ferro-nickel, a basic iron and ferro-chrome from a laterite ore.

Whilst the blast furnace remains pre-eminent as an iron producer, a number of alternative processes are being used or are approaching the stage of commercial operation.

The main reason that these processes have not been more widely adopted is the fact that the blast furnace has made remarkable strides in efficiency and in productivity during recent years. Added to this the fact that recent trials have shown that some oil or natural gas can now be used in the blast furnace replacing part of the metallurgical coke, giving the furnace flexibility in fuel requirement.

One final point that must be mentioned is the fact that the changing pattern of steel making, which favours hot metal rather than cold, gives an obvious advantage to those processes which produce a molten product.

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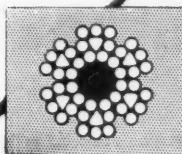
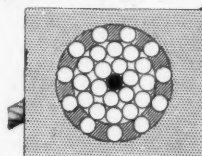


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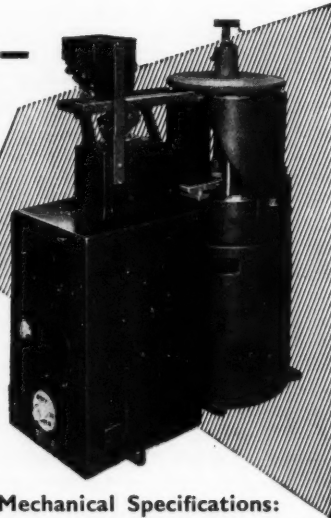
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Technical Briefs

Flotation Conditioning of Iron Ore with Petroleum Sulphate

In many flotation operations the effects of conditioning time, pulp density and intensity of agitation are important. This is certainly true in the flotation of iron ore and an attempt has been made by three research workers of the Jones and Laughlin Steel Corporation to investigate them. As a result, assuming a condition of constant chemistry, an overall mechanism of reversible transfer of reagents between ore and silica particles has been postulated and a rate equation developed. This is shown to correlate the data obtained in a number of tests, within experimental errors. To do this the experimental results were analysed in terms of a Performance Index defined as the product of recovery and grade improvement.

Although, as the authors state (Bull. I.M.M. No. 647), the surface chemistry involved is very complicated and lack of basic data precludes any attempt to speculate intelligently on the detailed mechanism, some significant facts emerge. The most important is that the process in conditioning iron ore under the test conditions, begins with all solids completely floatable and ends with only ore particles floatable and the silica particles non-floatable—the reverse to what is generally believed to occur.

Impeller speed and conditioning time are inter-related but there appears to be an optimum above which probable degradation of ore particles causes a rise in reagent consumption. Likewise the pulp density is also related to the other variables so that a rate equation for silica recovery can be deduced and can be used for the design of a batch or continuous conditioner, provided there is a dynamic similarity between the laboratory cell and the plant equipment.

QUEBEC'S COLUMBIUM

The concentration process for the pyrochlore ore in the Oka deposit, near Montreal, has been worked out successfully in a pilot plant, and consists of a combination of gravity to reject some barren waste, magnetic separation, and a number of flotation and table steps.

The pyrochlore occurs mainly as an accessory mineral in the carbonate rocks with other subordinate minerals such as magnetite, pyrite, biotite, apatite, olivine and pyroxene. After grinding to 48 mesh the pulp is treated in tables yielding a concentrate of the heavy minerals much in the same way as with a low grade tin ore. This rougher gravity concentrate is next treated by wet magnetic separation to remove magnetite, by flotation to remove pyrite, and by a second stage of flotation to remove residual calcite.

The concentrate, now enriched in pyrochlore and from which most other heavy minerals have been removed, is cleaned by double table treatment, making a 50 per cent C_{20}O_5 concentrate. Tailing from the cleaner tables, however, contains some further pyrochlore which is recovered by flotation, and a +50 per cent grade is said to be possible. An overall recovery of 80 per cent

is said to be obtained with flotation recovery between 97 and 98 per cent.

RECOVERY OF CHROMITE BY FLOTATION

The U.S. reserve of chromite is predominantly low grade, requiring beneficiation, and although considerable success has been achieved using gravity concentration, because of the extremely fine grained nature of many ores flotation has been investigated.

This work has shown that flotation can be used without prior desliming although in some cases the removal of -9 micron fines is desirable. Tall oil-petroleum sulphate emulsions together with fuel oil to provide a neutral film to support the weakly anchored fatty acid was used as a collector in an acid circuit. In some ores, the addition of fuel oil and a fluoride ion in a pre-conditioning step produced selective flocculation permitting satisfactory gangue depression with the acid circuit. These matters are described in U.S.B.M. RI. 5646 and U.S.B.M. RI. 5647.

A laboratory investigation by the U.S. Bureau of Mines of four limonitic and four sideritic ores indicated that magnetic separation of the roasted ore was the most satisfactory means of treatment. In the case of sideritic ores, a 15 min. roast at 500 deg. C. in the gases resulting from the decomposition of the ore was found suitable, but in the case of limonitic ores a 30 min. roast at 600 deg. C. in carbon monoxide (mixed ores) required to be subjected to an oxidizing roast before the reduction.

NEW AIR CLASSIFIER

The Buell "gravitational-inertial" classifier is now being used by American Agricultural Chemical Co. to recover fine phosphate rock which was formerly lost as dust. Not only is it necessary to recover this dust, but it is desirable to remove any entrained coarser material size that is more valuable and that will hamper the operation of the pneumatic handling system.

To provide the necessary separation of the coarser phosphate as well as the dust, a combination of the Buell classifier and cyclones is used.

In the Buell classifier, the entering air stream makes a sharp "U" turn shortly after entering the classifier and sets up eddies. Fine material is carried out with the air stream but the coarser material fails to change its direction and continues downwards. A secondary air supply crosses the falling coarse material near the bottom outlet and scrubs out any fine material adhering to the larger particles. The eddy current is said to provide a moving wall containing the curtain of feed material in the classifying zone without the detrimental frictional effects of a solid wall.

HEAT TREATMENT MATERIAL

The outstanding feature of Hecla 174 by Hadfields Ltd., is its ability to withstand alternate heating and cooling with-

out the occurrence of the crazing associated with heat shock, and experience has shown that it is generally superior to the conventional 10 per cent tungsten chromium steels in this respect. This characteristic renders it particularly suitable for those applications where operating conditions demand rapid cooling between operations.

Its hot hardness characteristics are comparable with those of the 10 per cent tungsten chromium steels up to temperatures of the order of 600 deg. C. Above this temperature its inferiority in this respect is offset by greater resistance to thermal crazing, which effectively reduces frictional stresses.

Further features are its low notch sensitivity and ability to air-harden in heavy section, which renders it desirable for those cases where intricate design features may give rise to troubles during oil or water hardening.

SUCCESSFUL ARSENIC ELIMINATION

After many years, the problem of treating the complex pyrite arsenopyrite gold ore with lead and silver values at the Marietta mine, Montana, has been solved.

In the past there have been several attempts to treat this ore involving amalgamation, gravity concentration and other means. A cyanide plant erected several years ago was an economic failure on the sulphide ore because of the low gold recovery which did not exceed 35 per cent.

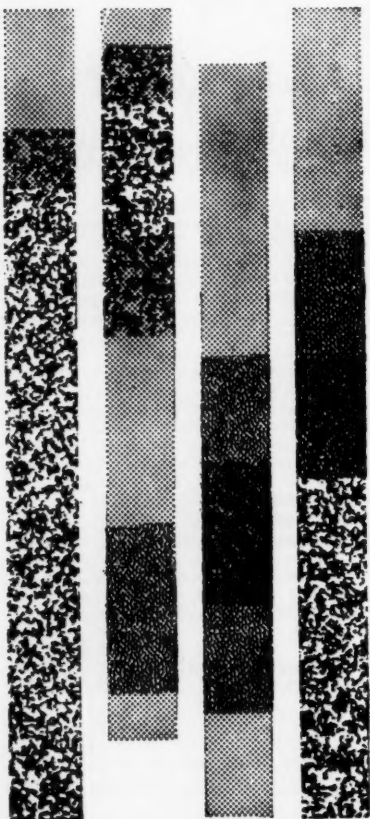
The solution of the problem was found in grinding the ore to 86 per cent -200 mesh in the presence of lime, soda ash and sodium sulphite. The ore pulp is then floated for 5 min. with amyl xanthate. Cleaning is performed in the presence of a little potassium permanganate which reduces the arsenic content to a little over 3 per cent when the smelter penalty is not excessive. The process has been described in *Mining World*.

FLOTATION OF BERYL ORE

Investigations of beryl ore from Wodgina, W. Australia, by CSIRO in Melbourne indicate that 80 per cent of the beryl can be recovered in a concentrate containing 10.6 per cent BeO from ores containing 4 per cent using flotation, by an anionic collector, after prior removal of the mica by the usual technique of using an amine in an acid circuit.

Desliming was found to be a prerequisite for successful flotation and neither calcium hypochlorite nor hydrofluoric acid were found necessary. This is presumably because in the USBM procedure a bulk beryl-felspar concentrate was produced, making use of fluoride activation with the subsequent destruction of the amine by the hypochlorite.

The best collectors appear to be petroleum sulphonates but sodium alkylsulphates were not found to be collectors for beryl under the conditions in the tests undertaken.



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MINING MISCELLANY

The American Metal Climax Foundation has made a grant of \$50,000 to New York University to establish a fellowship in its graduate school of business administration in memory of Mr. H. A. Vogelstein, the late president of American Metal Climax Inc. Mr. Vogelstein was also a director of Rhodesian Selection Trust, Tsumeb Corporation, and alternate director of Roan Antelope and O'okiep Copper-Co.

Burmah Oil Co., is studying plans for producing 1,000 tons of sulphur annually at the Sui gas field in Pakistan. The purification of 1,000 cu.ft. of Sui gas yields, as waste effluent, about 1.30 cu.ft. of carbon oxide. At the current rate of production, a possible yield of sulphur is estimated at about 900 tons annually, which would increase as gas offtake rises.

Over 109,600,000 tons of coal have been mined in the Ostrava-Karvina region of Czechoslovakia, as a result of the second five-year economic development plan (1956-60). Yearly output rose by more than 5,292,000 tons over the 1955 figure, a rise of 27.9 per cent, achieved mainly by mechanization of cutting and loading operations. Cutter-loaders produced 5,899,891 tons of coal (26.7 per cent of the total output) during 1960, compared with 1,000,000 tons in 1955. Some 59 machines are in use compared with 13 in 1955. Current plans for the coal mining industry include the opening of 18 new underground hard coal pits by 1975 and a progressive reduction of working hours. Nearly 20,000 miners in this area now work a five-day week.

More industrial explosives were used in the U.S. during 1959 than in any one year before, according to the U.S. Bureau of Mines. Domestic consumption during 1959 was 1,048,576,170 lbs., an increase of 9 per cent over 1958, and more than 1 per cent increase over the previous record year, 1957. The greatest percentage increase was for seismographic exploration, consumption for which was up by 20 per cent.

Cornelia Colliery, near Vereeniging, has broken its own national record by selling more than 4,000,000 tons of coal during 1960.

Mr. James A. Maloney, Ontario's Mines Minister, has forecast a total mineral production for the province during 1961 of more than one billion dollars (\$1,000,000,000), an all-time record.

A new organization, Corporacion Venezolana de Guayana, has been set up to develop iron ore, bauxite and manganese ore deposits in the Guyana region of Venezuela, as well as to take over the project for an aluminium industry, to be carried out with U.S. participation. The organization's activities will also cover the coalfields in the neighbourhood of Barcelona, Venezuela.

A new copper ore deposit, stated to be an important one, has been discovered

near Pazardjik in Bulgaria, from which an eventual production of 1,000,000 tonnes of copper ore annually is anticipated, when the necessary works have been erected.

Large lead ore deposits are reported to have been discovered in the Moulouya Valley in Morocco, reserves being estimated at between 5,000,000 and 6,000,000 tonnes, with an average lead content of 3 per cent. Opencast mining is being considered for the area and a washing plant is soon to start experimental work. A daily output of between 2,000 and 3,000 tonnes is thought possible. Investments totalling about 2,000,000 Moroccan francs will be required for the project. Reserves of lead-zinc ore are also reported to have been found at Djebel Bou-Arhous, between Gourrama and Beni Tadjji and it is understood that SOGEMI is to undertake their exploration.

Production of oil shale in the Estonian Republic of the Soviet Union is to increase fivefold over the coming 15 to 20 years, according to the East German news Agency ADN. Output will then be between 40,000,000 and 42,000,000 tonnes annually.

A new state corporation, Maschinoimpex, has been set up in Bulgaria to trade in mining, metal-working and smelting plant equipment and other plant. The corporation, together with the electrical and power plant trading company, Elektroimpex, has been formed by dividing the former Metallimport in two. Further reorganization has divided the former Technoimpex corporation for the import and export of complete industrial plants into Technoimport for importation, and Technoexport for export sales. All these organizations, which will take over the liabilities of their predecessors, are based in Sofia.

Equipment valued at over £80,000, is being installed at Forari, on the island of Efate, in the New Hebrides, South Pacific, where mining of rich manganese deposits is being carried out by the French company Compagnie Française des Phosphates de l'Océanie. Ruston and Hornsby and Davey Paxman and Co. are to supply all the diesel power, and also engines for launches and tugs for shipment of the manganese.

The Lord Mayor of London will open the rebuilt London Metal Exchange in Whittington Avenue on April 25 next. A dinner will be given on the same day, by the London Metal Exchange, at which the Rt. Hon. Ian Macleod, Secretary of State for the Colonies, is to be guest of honour.

The Greek industrial development programme for 1961 includes the allocation of 200,750,000 drachmae for mining exploitation.

Mitsui Mining and Smelting Co. of Japan has acquired 400,000 shares at a paid-up value of 8s, each in the Ravens-thorpe Copper Mines N.L. of West

Australia, thereby making £160,000 immediately available for development. The sale of the company's entire production to Mitsui for the next 10 years is included in the agreement. The purchase terms are subject to review periodically, and ensure that Ravens-thorpe receives world parity prices at all times. It is hoped to produce 200 tons weekly by the end of 1961, or early 1962, and that a first shipment of about 2,000 tons of concentrates to Japan will be made in late March, 1961.

Figures published by the German Ministry of Trade show that over the first half of 1960 some DM. 3,800,000 was invested by West Germany in the mineral ores industry outside the Federal Republic. A further D.M. 3,300,000 was invested in foreign smelting and metal production plants. D.M. 7,200,000 in metal goods production, D.M. 3,500,000 in metal goods trading, and D.M. 1,500,000 on the production and D.M. 2,300,000 in trading of ferrous metal semi-products.

The Japanese mining firm, Yawata, has announced that it is to start exploitation of iron ore reserves situated off the coast of the Japanese island of Kyushu.

General Martijena, head of the Argentine Military Factory, which recently signed a contract with Misipa (see *Mining Journal*, January 20), has stated that iron deposits proved in the Sierra Grande area amount to some 70,000,000 tonnes, while total reserves are probably in the region of 200,000,000 tonnes. The Sierra Grande ore, it was added, could be delivered at the San Nicolas steelworks quay at a cost of some \$U.S.8 per tonne, including freight costs. General Martijena estimated that \$U.S.190,000,000 would be needed to extract 4,200,000 tonnes of ore annually and produce 750,000 tonnes of semi-products and products.

Swedish mineral mining production, in terms of value, was 29 per cent higher in 1960 than in the previous year, compared with an overall industrial production increase, in value, of only 9 per cent. Production, in value, of the metal-processing industry was up by 12 per cent on the 1959 total.

Cuba is to export manganese ore to Bulgaria under a trade pact signed between the two countries.

A lignite processing plant at Mae Moh in North Thailand, provided by Australia under the Colombo Plan, was opened recently. The plant is processing 1,200 tonnes of lignite daily, some of which is for the Mae Moh thermal power stations, servicing the Yanhee Dam construction, and the bulk for Bangkok's power stations.

India is to get \$11,700,000 worth of aluminium, copper and nickel from Canada under the Colombo Plan in 1960/61 period.

Metals and Minerals

Platinum on the "Up-and-Up?"

Since January last year the official price of platinum has been held by the leading refiners at £30 5s. per troy oz. in the U.K. and \$82-\$85 according to quantity in the U.S. Throughout much of this period little buying interest has been apparent in the free platinum markets, but it must be remembered that transactions in these markets normally involve small parcels of metal and represent only a marginal trade, as compared with the substantial amounts passing between the refiners and their regular customers in the glass, chemical, steel and electrical industries.

The annual report of Rustenburg Platinum Mines (see *The Mining Journal*, December 30, 1960, p. 746), stated that the quantity of metal sold by the company in the year to August 31 was virtually the same as that disposed of in the preceding twelve months, and that at this stage there was no evidence to indicate that the volume of sales for the current year would be materially different from that of the two preceding years. The report added that sales to the U.S. markets had been "somewhat disappointing", but those to other countries had improved.

At a time when a certain amount of apprehension was beginning to be felt in some quarters as to the potential impact

of the U.S. recession on demand and prices, the picture presented by Rustenburg was distinctly reassuring. Still more heartening are the views expressed in a recent statement by Mr. Charles W. Engelhard, president and board chairman of Engelhard Industries, Inc., who regards the industrial use of the platinum metals as being in a "definite long-term uptrend". Mr. Engelhard also stated that 1960 might have seen an all-time record for these metals and that 1961 was "shaping up as another good year".

Today's continual trend towards higher equipment operating temperatures, together with the need for increased corrosion resistance and higher product purity, are placing greater demands on the platinum metals. As an example, Mr. Engelhard cited the glass industry, which utilizes platinum metal crucibles in melting and handling molten glass of the highest quality. Another use of platinum within this industry is in the production of glass fibres, which are extruded through orifices in the bottom of the platinum container in which the glass is melted. "Space age technology is another field which is capitalizing on the properties of the platinum metals", added Mr. Engelhard. "It's no surprise that palladium contacts are often used here, as they are in telephone and other communications circuits where the

contacts must remain reliable for millions and millions of make-and-break cycles".

Technological progress is leading to the more efficient utilization of the platinum metals and is broadening their applications. As an example, electrodes are now available commercially which consist of a titanium carrier with a thin coating of deposited platinum to provide the desired chemical and electrical properties. Availability of these new electrodes is expected to make possible the economic use of platinum in several applications.

Mr. Engelhard's encouraging verdict on usage in 1960 is supported by the latest statistics issued by the Bureau of Mines, U.S. Department of the Interior, which cover the third quarter of the year. These show that in the first nine months platinum-group metal sales totalled about 577,200 oz. compared with 558,500 oz. in the corresponding period of 1959. Over the same period, however, imports fell by 25 per cent to 550,000 oz. and refinery production by 32 per cent. It should also be noted that sales to consuming industries in the third quarter at 149,800 oz. were about 4 per cent less than in the preceding quarter and 7 per cent less than in the corresponding period of 1959.

SOVIET DIAMOND AGREEMENT

The agreement between the Diamond Corporation and the Soviet authorities, under which all Soviet diamonds

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intended for sale in the West are purchased by the Corporation and marketed through the Central Selling Organization of De Beers, has been renewed for another year. No further details have been released, nor has any indication been given as to the number of stones published by the Diamond Corporation since the original agreement was signed last year. Since the U.S.S.R. is a net importer of industrial diamonds, it can be assumed that, at any rate in practice, the Agreement covers only gems. At this stage in the development of the Yukutia fields it seems unlikely that the quantity of Soviet stones purchased by the Diamond Corporation can be of very great significance.

TIN SLAG FOR SALE

The General Services Administration has announced in Washington that it will offer for public sale or intra-governmental transfer 18,700 tons of tin slag. The Agency said that the sale or transfer would take place in about two months. The slag is in the supplemental stockpile and no Congressional approval is needed. GSA added that under present recovery methods the slag, which was obtained from Malaya as a by-product of tin smelting, was capable of producing high yields of tantalum and columbium.

U.S. BARTER LIST

The U.S. Agriculture Department has added six commodities to the list of materials for which it is willing to barter

surplus agricultural products. The new materials are cadmium, corundum, manganese (battery grade, natural), palladium, platinum and thorium nitrate. Industrial diamonds, chromite (chemical grade) and manganese (chemical grades "A" and "B") have been removed from the list.

NON-FERROUS METAL SALES

The General Services Administration has asked Congress for authority to sell almost 4,000 tons of nickel, cobalt and copper-bearing metals. At the same time GSA announced that it was soliciting proposals for the upgrading of government-owned tungsten concentrates into higher use forms.

WOLFRAM'S FURTHER FALL

The recent downward movement in wolfram ore shipment prices, noted in our last week's issue, has been extended. Prices are now mentioned at from 141s. to 146s. per 1-ton unit c.i.f. Europe compared with 145s. to 149s. previously. The new range is understood to reflect business at lower prices.

Wolfram now stands at its lowest level since November, 1959, and the possibility of a further decline can scarcely be excluded. The first price cut, made some two weeks ago, was attributed to the sale of some 50-70 tons of ore from Eastern Europe at a heavy discount. Since then, supplies from Communist countries have continued to come on to

the market at a discount, while other suppliers have become more anxious to dispose of their ore. Moreover, the improved prices ruling last year have led to some expansion in production. So far the increased output has been readily absorbed but it is believed that many European consumers are now well enough stocked to be able to remain out of the market until prices have settled down again.

★

In 1960, the domestic tungsten industry had its best year since 1951, according to the Bureau of Mines, U.S. Department of the Interior. Concentrate consumption surpassed the highest level of the preceding eight years, while mine shipments exceeded those of the last two years. Imports for consumption, however, were the lowest for 20 years. At the end of the year, stocks were substantially below those of the previous three years.

Ore and concentrates estimated at 3,500 tons contained tungsten were shipped by domestic producers. Operations were resumed at the Hamme Mine in Vance County, North Carolina, and the Calvert Mine in Beaverhead County, Montana, both of which had been shut down throughout 1959. The domestic industry consumed about 5,500 tons in 1960—more than in any year since 1951 and 11 per cent more than in 1959. Imports for consumption totalled about 1,600 tons of contained tungsten, representing a decline of about 1,000 tons from the previous year. Portugal supplied 25 per cent of the total, Australia 23 per cent, Brazil 20 per cent, and Bolivia 12 per cent.

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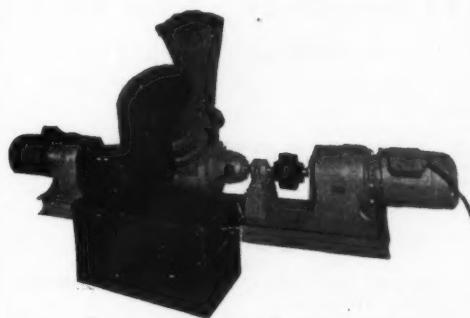
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Copper • Tin • Lead • Zinc

(From Our London Metal Exchange Correspondent)

The improved overall sentiment referred to last week proved to be short-lived and after a few firm markets prices slipped back to their previous levels and activity decreased.

STILL TOO MUCH COPPER ?

The world price structure for copper remains unchanged, and in London prices have remained steady at the lower level with the maintenance of a small contango, although some experts expect this to disappear in spite of the continuing rise in stocks which last week totalled 15,320 tons, 375 tons higher than the previous week.

The announcement of reductions in production was completed when Kennecott announced that it was cutting production in its Western Division by a total of about 4,500 tons per month commencing February 1. This brings the total cutbacks announced to something of the order of 250,000 tons per

ANOTHER VIEW ON PLATINUM

Much less bullish than Mr. Engelhard is Mr. D. A. B. Watson, chairman of Rustenburg Platinum, in his newly-published statement, which is discussed on page 110 and should be considered in conjunction with our note on Mr. Engelhard's remarks on page 102.

year, which by itself would be almost sufficient to balance production and consumption if both remained at the same basic levels as last year. Unfortunately, on the production side a number of smaller increases have taken place, whilst on the consumption side it is generally assumed that the 1961 figure will be several hundred thousand tons below that for 1960. Yet even if the pessimists are proved wrong, it is almost certain that the first half of 1961 will make a very poor showing.

Taking these facts into account, it would appear that there is still a considerable over-production in the world which may lead to the necessity for further cutbacks or, alternatively, appreciable stockpiling by the main producers. It is believed that imports by Iron Curtain countries may increase, and already there are rumours that negotiations are proceeding for the purchase of 60,000 tons of Chilean copper; should this contract be concluded as an additional import, it will materially help the overall situation.

It is announced by Union Minière that Katanga's copper production for 1960 totalled 300,704 tons as compared with 280,403 tons for the previous year and that the total was reached despite the fact that curtailments in production became effective during the last quarter.

TIN REMAINS DULL

The tin market has remained featureless and has sunk back to the £780 level with consumer interest varying considerably from day to day. The strike in Bolivia, referred to last week, has been settled and further trouble is not expected for the time being. Stocks in official warehouses increased a further 53 tons to a total of 10,040 tons.

On Thursday the Eastern price was equivalent to £791½ per ton c.i.f. Europe.

LEAD AND ZINC STOCKS HIGHER

The main interest in the lead and zinc markets has been the establishment of a contango in the latter, believed to be due to arrivals of considerable tonnages of metal being placed on warrant. Stocks of zinc in official warehouses rose 195 tons, giving a total last Saturday of 2,679 tons. Lead stocks also showed a considerable increase of 1,718 tons giving a total of 10,564 tons. It has only been good consumer offtake which has maintained the price level and some experts feel that this is unlikely to continue and that the lead price will recede once more.

Union Minière announced that the production of Metalkat last year showed only a very slight decrease from 1959 at 53,358 tons compared with 54,810 tons. O.E.E.C. countries' production of lead in December amounted to 62,894 tonnes as compared with 62,602 tonnes in November. End of month stocks showed a small decline at 53,624 tonnes as compared with 55,652 tonnes. Zinc production showed a slight increase at 74,238 tonnes as compared with 72,958 tonnes, and end of month stocks rose to 47,517 tonnes as compared with 44,814 tonnes.

OFFICIAL TURNOVERS

Official turnovers, in 1,000 tons, for the week ending January 21 (previous week's figures in parentheses) are:—

Copper	19,525	(15,300)
Tin	1,075	(890)
Lead	7,330	(10,000)
Zinc	5,675	(8,000)

Closing prices are as follows:

	January 19		January 26	
	Buyers	Sellers	Buyers	Sellers
COPPER				
Cash	£222½	£223	£217	£217½
Three months	£222½	£223	£217½	£217½
Settlement		£223		£217½
LEAD				
Current ½ month	£64½	£64½	£63½	£63½
Three months	£65½	£65½	£64½	£64½
TIN				
Cash	£784	£784½	£783½	£784
Three months	£787½	£788	£786½	£787
Settlement		£784½		£784
ZINC				
Current ½ month	£78½	£78½	£78½	£78½
Three months	£78½	£78½	£78½	£78½

LONDON METAL AND ORE PRICES, JAN. 26, 1961

METAL PRICES

Aluminium, 99.5%, £186 per ton	Magnesium, 2s. 2½d./2s. 3d. lb.
Antimony—	Manganese Metal (96%/98%) £275/£285
English (99%) delivered, 10 cwt. and over £210 per ton	Nickel, 99.5% (home trade) £600 per ton
Arsenic, £400 per ton	Osmium, £18/£22 oz. nom.
Bismuth (min. 1 ton lots) 16s. lb. nom.	Osmiridium, nom.
Cadmium 11s. 0d. lb.	Palladium, imported, £8 12s. 6d.
Cerium (99%) net, £15 0s. lb. delivered U.K.	Platinum U.K. and Empire Refined £30 5s.
Chromium, Cr. 99% 6s. 11d./7s. 4d. lb.	Imported £28/£28½
Cobalt, 12s. lb.	Quicksilver, £69 ex-warehouse
Germanium, 99.99%, Ge. kilo lots 2s. 5d. per gram	Rhodium, £43/£45 oz.
Gold, 252s. 5d.	Ruthenium, £14/£16 oz. nom.
Iridium, £20/£23 oz. nom.	Selenium, 46s. 6d. per lb.
Lanthanum (98%/99%) 15s. per gram.	Silver, 79½d. f. oz. spot and 80d. f.d.
	Tellurium, 28s. 6d. lb.

ORES AND OXIDES

Antimony Ore (60%) basis	24s. 0d./26s. 0d. per unit c.i.f.
Beryl (min. 10 per cent BeO)	220s./230s. per 1. ton unit BeO
Bismuth	65% 8s. 6d. lb. c.i.f.
Chrome Ore—	18/20% 1s. 3d. lb. c.i.f.
Rhodesian Metallurgical (semifriable 48%) (Ratio 3 : 1)	£15 5s. 0d. per ton c.i.f.
Hard Lump 45% (Ratio 3 : 1)	£15 10s. 0d. per ton c.i.f.
Refractory 40% (Ratio 3 : 1)	£11 0s. 0d. per ton c.i.f.
Smalls 44% (Ratio 3 : 1)	£13 5s. 0d. per ton c.i.f.
Baluchistan 48% (Ratio 3 : 1)	£11 15s. 0d. per ton f.o.b.
Columbite, Nigerian quality, basis 70% combined pentoxides (Ratio 10 : 1)	Nb ₂ O ₅ : Ta ₂ O ₅ 155s./170s. 0d. per 1. ton unit c.i.f.
Fluorspar—	
Acid Grade, Flotated Material	£22 13s. 3d. per ton ex. works
Metallurgical (75/80% CaF ₂)	156s. 0d. ex. works
Lithium Ore—	
Petalite min. 34% Li ₂ O	50s. 0d./55s. 0d. per unit f.o.b. Beira
Lepidolite min. 34% Li ₂ O	50s. 0d./55s. 0d. per unit f.o.b. Beira
Amblygonite basis 7% Li ₂ O	75s./85s. per ton f.o.b. Beira
Magnesite, ground calcined	£28 0s./£30 0s. d/d
Magnesite Raw (ground)	£21 0s./£23 0s. d/d
Manganese Ore Indian—	
Europe (46% 48%) basis 60s. 0d. freight	73d./75d. c.i.f. nom.
Manganese Ore (43% 45%)	69d./71d. c.i.f. nom.
Manganese Ore (38% 40%)	nom.
Molybdenite (85%) basis	8s. 11d. per lb. f.o.b.)
Titanium Ore—	
Rutile 95/97% TiO ₂ (prompt delivery)	£27 10s. 0d. per ton c.i.f. Aust'n
Ilmenite 50/52% TiO ₂	£11 10s. per ton c.i.f. Malayan
Wolfram and Scheelite (65%)	141s. 0d./146s. 0d. per unit c.i.f.
Vanadium—	
Fused oxide 95% V ₂ O ₅	7s. 6d./8s. per lb. V ₂ O ₅ c.i.f.
Zircon Sand (Australian) 65-66% ZrO ₂	£16/£16 10s. ton c.i.f.

Mining Finance

No Close-Down Says Ghana

Last week when discussing the curtailment of operations at the Bibiani and Amalgamated Banket Areas gold properties in Ghana with a view to their eventual closing down—a move blamed by the managements on the impact of the enforced higher wages for Africans—it was stated here that the really unknown factor was whether the Ghana Government would take any steps to try and keep the mines in being. Such steps have now been taken. They were quick and drastic.

A Bill will be put before Parliament next month—but it will be effective from January 24—whereby maximum fines of £100,000, or £1,000 per day if the offence is continued, plus prison terms of up to ten years for directors, managers and officers of corporate bodies holding mining concessions, will be imposed if mines are closed or allowed to flood without the written permission of the Government Inspector of Mines.

The Bill will also provide that mining companies can avoid financial hardship, if they wish, by surrendering their concessions, but any concern doing this may at the same time be required to give up one or more of its other concessions while any associated company of the concession holder may also be required to surrender concessions. This implies, of course, that if Bibiani wanted to give

up its mines the government could also acquire part of the Ashanti property. The government will, it is stated, give compensation for concessions taken over at a rate equivalent to net profits that would have been obtained from developed ore at the date of the surrender. It would also negotiate for the purchase of the plant and machinery needed to keep the mine open and in working condition. Where all this will in actual practice lead the government or the companies is far from clear. The heads of both the London-based mining groups, Major-General Sir Edward L. Spears and Mr. Cyril Burns, are out on the Coast and will no doubt make every effort to reach a compromise.

It seems likely that it was the threatened closure of Amalgamated Banket rather than of Bibiani which really stung the government into action. The government has a big development project for the Tarkwa valley where the former's properties are situated. Considerable political and economic importance is attached to this project, which would obviously be seriously affected, if not rendered impracticable, should A.B.A. proceed with its plans which, aside from involving the almost immediate dismissal of 1,150 African workers, imply that many more than this number will be thrown out of employment by the end of the year when A.B.A.

reckons to have reclaimed the available ore from the A.V.S. and Fanti South sections.

The immediate dismissals would arise from the decision to close down straight away the Tamsoo, Effueta and Man-train sections which would be allowed to flood as soon as all plant and equipment had been salvaged.

From a statement issued in London by Mr. Gbedemah, the Ghana Finance Minister, it seems apparent that one of the lesser reasons behind the present move is that should the gold price go up, any prior flooding of mining workings would lose irretrievably the ore that might then be payable. "This Bill is designed to safeguard the mineral reserves of Ghana", Mr. Gbedemah says, and to prevent a mine being rendered unworkable "even though the price of the extracted mineral rises, or it becomes otherwise profitable, or expedient in the national interest, to work it again. In this way Ghana may lose the advantage of its mineral reserves unless steps are taken to control the closing of mines".

The share market impact of all this was naturally to depress prices. Bibiani, for instance, which had risen to 3s. 3d. on hopes concerning the capital returns (discussed here last week) that might eventually come about when operations cease, fell back to 2s. 6d. on fears that the orderly curtailment of operations planned might not now be put into practice. Ashanti at 13s. 6d. were also depressed, mainly because of the sentiment in Accra Government circles that it should be made to help its sister company, Bibiani, a suggestion that was succinctly described by General Spears as "nonsense".

London Market Highlights

Waning interest in both Johannesburg and London produced a distinctly dull tendency in the South African gold share market this week. There was little selling to speak of, but matters were not helped by a statement from the president of the U.S. Federal Reserve Bank to the effect that an upward revision in the official gold price was unlikely. Also unhelpful was a report—not taken too seriously—that an African campaign against apartheid might include attempts to withdraw recruits from the mines.

About the only gleam of interest in these dreary surroundings was the persistent Cape demand for a few of the uranium stocks. Interest here was heightened by the broad details of the new contract arrangements. Dominion Reef's stayed a particularly firm market at 20s.; Johannesburg talk suggested that under the new uranium set-up the mine would close down and optimistic "break-up" estimates ranging to as much as 35s. a share were mentioned, though London dealers could see little justification for them.

Otherwise, Free State Geduld led the downdrift in Ka.firs, falling 4s. 6d. to 116s. 3d. Western Holdings came back 3s. 9d. to 153s. 1½d. and other sizeable losses were registered in City Deep (20s. 9d.), Geduld (55s.) and Anglo American (165s.).

Platinums stayed firm for a while following Mr. Engelhard's optimistic views on the metal's prospects. But share prices began to ease back in front

of the decidedly less bullish views of the Rustenburg chairman.

Company decisions to prepare for the closing of mines coupled with Ghana Government threats of fines and imprisonment, completely unsettled an already dull West African gold share market. In three days, Amalgamated Banket dropped from 7½d. to 4½d. and Bibiani fell 7½d. to 2s. 6d. Ashanti were especially disturbed by suggestions that the richer producers might be forced to come to the aid of the marginals and the shares topped from 15s. 1½d. to 13s. 6d., nearly half the best price reached during the past 12 months. Western Selection, 4½d. down at 3s. 1½d. were standing at their lowest for many years.

Tin shares moved narrowly for the most part, but the firm undertone of the market was helped by some optimistic comment on the statistical position of the metal. Pengkalen improved to 9s. 4½d. for a while on the latest interim, but later reacted to 9s. while Kent hardened to 3s. 3d. for a similar reason. For a while Southern Malayan were supported and the price (22s. 6d.) caught up with that of Malayan, but a sudden Singapore demand for the latter shares on Wednesday lifted them to 23s. 6d.

Coppers did little more than fluctuate narrowly for most of the time. There was, however, a brief flurry of interest in Bancroft at around 14s. 6d. Another flurry which had no very obvious explanation lifted Mountain Copper shares 1s. 4½d. to a 12-month high of 17s. 9d. Profit-takers soon appeared, however, and the price reacted to 16s. 9d.

S. AFRICAN URANIUM—NEW TERMS

The revised stretched-out uranium contracts between the U.K. and the U.S. as purchasers and South Africa as seller are discussed in the accompanying quarterly supplement. The exact details of the stretch-out have been announced by the United Kingdom Atomic Energy Authority.

The new agreement will operate from January 1, 1961. The average annual rate of delivery of uranium oxide during the six-year period to December 31, 1966, will be 3,733 tons compared with 4,725 tons under the old arrangement. Of the total of 28,350 tons previously contracted for from 1961 to 1966, there will now be a deferment of 5,953 tons which will be delivered between January 1, 1967, and December 31, 1970. In other words there will be no change in the total amount that the U.K. and the U.S. will take, but its delivery will now be over a longer period, although the bulk will still be taken by the end of 1966. The 5,953 tons to be delivered thereafter represents an annual rate of only 1,488 tons.

There is also a new price arrangement whereby there will be a fixed price for the total tonnage instead of prices varying between individual producers and calculated on an incentive type cost formula. The U.K. announcement does not say what the new price is, but in Washington it has been stated that the U.S. will pay \$11.20 c. a pound, equal to approximately £4 sterling.

Johannesburg expects that the Chamber of Mines will now announce how the

individual mines' quotas will be affected and that this will be followed, probably next week, by details from the mining groups of the rationalization scheme whereby some uranium plants will be closed down and their quotas sold to other mines. For instance, in the Orange Free State it is generally anticipated that the President Steyn plant will be shut and production concentrated on that at Welkom.

RUSTENBURG PLATINUM MAY PAY LESS

Mr. D. A. B. Watson, chairman of Rustenburg Platinum Mines, the big South African producer of the platinum group metals, is bold enough in his annual statement to make a fairly forthright forecast of the company's profit prospects for the year to August 31 next. If sales are maintained at the level currently indicated and if there is no reduction in the official price of platinum (which has held at £30. 5s. an ounce since January, 1960) then Mr. Watson considers that net profits will be about three-quarters of the comparable amount for 1959-60. This comparable amount appears to have been about £2,346,000, three-quarters of which amounts to £1,760,000. This would imply a cut in the Rustenburg dividend. The total of 49s. 9d. per £1 share paid for 1959-60 required a pay-out of £2,160,642.

But, as Mr. Watson is the first to admit, forecasts of this kind can be no more than tentative because the platinum market can change abruptly, either for better or for worse. At the moment the improvement in Rustenburg's sales, which took place during the early months of the present financial year, has not been maintained and "trading conditions have again become dull". It is stated that the level of demand in the U.K. and for export to countries other than the U.S. has not varied significantly, but the continued quiet business conditions in America are adversely affecting sales there. So Rustenburg's sales average for 1960-61 to date is "somewhat less" than for the whole of 1959-60.

Mr. Watson once again stresses that Rustenburg's policy of building up its stocks together with its potential productive capacity should in future be able to control to some extent the violent upward surges in the platinum market that have been seen in the past. Downward movements can, of course, still occur, but they appear to contain their own remedy in that any really low prices soon check the free flow of metal to the world's markets.

Rustenburg's £868,600 capital is held as to Potgietersrust 43.3 per cent Waterval 39.2 per cent and Union Platinum 17.5 per cent. The shares of these companies are quoted at prices that show substantial yields of around 15 per cent on last year's dividends. In other words, they already appear to be discounting some cut in their payments, a cut which would automatically follow any reduction in the Rustenburg distribution.

RIISING TIDE OF TIN DIVIDENDS

The flow of rising tin-mining dividends continues at a steady pace. Pengkalen, a single-dredge concern, has started off its current financial year to next September well with an interim of 4½d.

per 2s. share. This compares with a first payment a year ago of only 1½d. This was followed by two further interims of 3d. apiece. For 1958-59 the final distribution was declared as late as May. So there is still a chance that the 1959-60 total payment will be something more than the 7½d. declared to date. At 9s. 4½d. the shares have been responsive to the latest announcement.

In the same Cornish-Malayan group, Kent, (F.M.S.) also a one-dredge producer, has declared an interim of 3d. on account of 1960. For 1959 there was a single payment of 3d. which was announced last July. The market is therefore tending to hope that there will be a balance distribution for last year. The 1s. shares are 3s. 4½d.

Tanjong continues to step up its distribution for 1960. A fourth interim of 1s. makes 3s. 7½d. to date. For 1959 there was a small final last June. It is thus hoped that last year's total dividend will be brought up to at least 4s., although the company's tin output has actually been falling to some extent despite de-restriction. On a 4s. basis the yield on the 5s. shares at 23s. would be as much as 17.4 per cent, a generous return for a company of this calibre.

Tronoh, which not only works several dredges but also has substantial investments in other tin concerns, has declared a second interim of 2s. for 1960 making 3s. 6d. to date with a final promised for next autumn. The company has adopted a new dividend policy whereby there will only be three declarations annually instead of five before. The 1959 total was 3s. 1½d. The market hopes for at least 5s. 6d. in all for the past year which would give the 5s. shares a potential yield of nearly 15 per cent at 37s.

Gopeng, which wins its tin by hydraulic methods, has started its payments for the year to next September with an interim of 9d. compared with 3d. last February. For 1959-60 there have so far been four interims aggregating 1s. 10½d. which will prove to be the total for that period if the previous year's pattern is followed. On this basis the 3s. 6d. stock units at 30s. offer a minimum return of 6.25 per cent. The company, which has acquired two other tin concerns during the past eighteen months, reported a sharp increase in its December quarter sales which were 652 tons of tin ore compared with only 470½ tons in the previous three months.

TREBLED PROFITS BY 'FRISCOS

There was a remarkable recovery in the earnings of San Francisco Mines of Mexico in the year to September 30 last. This lead-zinc-silver producer in the Union Corporation group actually trebled its net earnings at £407,125, the 1958-59 figure being only £133,514. There is consequently a return to the dividend list for the first time since 1956-57. The payment of 1s. 6d. per 10s. unit, together with the directors' additional remuneration thereon, takes only £193,970, so it is more than twice covered by earnings and allows an allocation of £150,000 to contingencies reserve as well as a rise of £63,155 in the carry-forward to £443,089.

As usual, the net profit is arrived at after heavy tax charges, Mexican tax taking £2,387,856 out of a gross surplus of £2,794,981, a syphoning off of no less than 85 per cent. The higher earnings will have stemmed partly from the

buoyant lead and zinc prices in the early part of last year and partly from the sale of the company's accumulated stocks of zinc concentrates, a contract for which was secured as announced by the chairman at the meeting last year.

It is possible that the profit from this sale is regarded as being of a special nature and may thus have played its part in the Board's decision to be conservative in its dividend policy. There are other factors that may also have prompted caution. The metal prices have come back and the outlook for both lead and zinc has become rather obscure. It is also possible that stocks of refined lead—now, contrary to the experience of bygone years, the Cinderella of the two metals—are remaining a burden on San Francisco's finances. The new chairman, Mr. R. H. MacWilliam, who succeeds the late Mr. A. V. Conrad, will doubtless clarify these matters in his annual statement which, if past practice is followed, should be issued with the annual report next month.

Meanwhile, 'Friscos 10s. stock units at 17s. 6d. cum dividend have shown little response to the resumption of distributions, probably mainly because most lead-zinc issues are under a cloud just now and may well remain so pending the March meeting of the Lead-Zinc Study Group, which may possibly decide that producers should operate a cutback policy for zinc output as well as that already existing in respect of lead. The yield on 'Friscos is a little over 9 per cent.

SOUTH AFRICAN TOWNSHIPS

South African Townships Mining and Finance Corporation, which has been a subsidiary of Rand Selection Corporation since 1951, did slightly less well in the year to last September when its consolidated net profit was £399,793 against £461,156 in 1958-59. The dividend, however, is again 1s. 6d. absorbing £360,000. S.A. Towns' main interests are in the Orange Free State gold fields. It thus suffered market depreciation of its shareholdings as a result of the impact of the Sharpeville affair on the Kaffir market. Consequently, whereas the book value of quoted investments increased by £110,234 to £1,462,683, the market value was down by over £2,200,000 at £6,246,779.

The chairman, Mr. Anthony Wilson, points out, however, that this was still not far short of £1,000,000 higher than in 1958 while since last September there has been an improvement in the market. S.A. Towns 10s. shares, in which there is naturally only a limited market (some 93 per cent of them being held by Rand Selection) are quoted around 23s.

DAVIES INVESTMENTS LTD.,
Private Bankers (Gross assets exceed £2,000,000), are paying 7½% p.a. interest on deposits for the eighth year in succession, with extra ½% added annually on each £500 unit. Details and Audited Balance Sheet from Investment Dpt. MN., Davies Investments Ltd., Danes Inn House, 265 Strand, London, W.C.2.

PUBLICATIONS RECEIVED

Mathematical Tables for the Approximation of Geophysical Anomalies by V. A. Kazinskii, Published by Pergamon Press Ltd., Headington Hall, Oxford, pp. 93, price 35s. The table and methods of procedure presented in the volume are primarily designed for the reduction and interpretation of underground measurements by gravitational variometer and gravimeter. The book should also be of assistance in handling overground and marine gravitational measurements, and when studying the dividing boundaries of different depth structures in the light of gravity anomalies. The tables may be used for approximations of the vertical gradient of gravity produced by any geological body, and have a wide application in similar fields.

Further use may be made of the tables when finding the density of strata and bodies of ore, while the actual principle of double interpolation may be applied for methods of determining mass anomalies in accordance with Ostrogradskii's formula, the co-ordinates of a centre of gravity using Green's formula, or the volume of a working; alternatively, the principle can be employed in approximating magnetic field elements, in smoothing out gravity anomalies from gravitational fields with the aid of the mean value theorem for a definite integral, or in investigating the Earth's figure in accordance with the Stokes and Meinesz formulae.

The General Electric Company's recent publication *A Century of Service to the Mining Industry* describes, with many illustrations, the development of the company, from 1860, when Fraser and Chalmers started making mining and metallurgical machinery in America.

Thirty years later they formed a British company, Fraser & Chalmers Ltd., with works at Erith in order to be nearer to the financial centre which was providing the capital for the development of the rapidly expanding gold fields of the Witwatersrand in South Africa. The link with Chicago was broken shortly after the turn of the century and thereafter all the machines bearing the well-known name of Fraser & Chalmers were made at Erith.

In 1905 the company pioneered the introduction of the "Rateau" or multi-stage impulse turbine into Great Britain. The need for generators to link up with the turbines led Fraser & Chalmers Ltd. to become associated in due course with The General Electric Company Limited and finally, in 1918, to merge with them. First known as Fraser & Chalmers Engineering Works and now as the Erith Engineering Works, they are responsible for the production of all the Company's heavy mechanical equipment.

The manufacture of individual machines is not the only activity of the Erith Works. The engineering staff designs and supplies complete installations for mineral processing, cyanidation, smelting, materials handling and coal preparation. Winding engines, compressors, blowers and power generating plant can also be provided. Motors, alternators, switchgear, transformers and other electrical equipment are designed and manufactured at the company's Witton Engineering Works in Birmingham. Steam for turbo-alternators is usually produced in coal-fired or oil-fired boilers,

but it may well be that a nuclear reactor might prove to be a practicable source of heat for steam-raising in a large mining area remote from any source of fuel. This type of plant can now be supplied by the Erith Works, where a well-equipped atomic energy division has been established for the purpose.

The combination of both heavy mechanical and electrical works within a single organization enables large contracts to be handled with close collaboration and maximum efficiency. Thus, the panning and construction of the whole of the surface installations of a mine, quarry or works can be undertaken, the G.E.C. acting as main contractor for the complete project with all the financial and technical resources of the company behind it.

The geological structure that emerged from mapping the Momi-Lomawai area to the west, described in Bulletin 3, of the Geological Survey Department, Suva, Fiji, together with associated small base metal indications, appeared well worth following eastwards into the Singatoka area. These recent geological observations around Singatoka are expressed in the Department's *Bulletin 6, Geology of Singatoka Area Viti Levu*, by R. E. Houtz, Geologist. Price 12s. 6d. (including map).

Four additional, small base metal discoveries were made; some now require further attention. Observations are recorded about manganese; moreover the presence of boulders of high grade ore in the Sovi river would seem to bear further investigation. Magnetite, ilmenite and haematite could be extracted relatively easily from the Singatoka dune sands; other heavy minerals have been recorded there. Abundant limestone outcrops in this region and suitable hard rock localities are also mentioned.

British Standard for Thermometers for measuring air cooling power (B.S. 3276: 1960) specifies the essential requirements of a series of thermometers for measuring low wind speeds or the efficiency of ventilation in mines, factories, etc. It includes standard charts, in the form of nomograms, which enable the "cooling power" of the atmosphere and the air speed to be derived from the air temperature and the time taken for the heated thermometer to cool between two specified temperatures 3 deg. C. or 5 deg. F. apart. For the convenience of users, there is a list of references to published studies on the practical use of this type of thermometer. Copies of this standard may be obtained from the British Standards Institution, Sales Branch, 2 Park Street, London, W.1, price 5s.

A recent publication by British Insulated Callender's Cables entitled *The Electrician's Mate* has been compiled to offer sound practical advice on mineral-insulated cable work. Containing numerous diagrams and tables, the booklet is intended for handy reference for those engaged in practical cable installations.

Abstracts of papers presented at the Fifth Symposium on Magnetism and

Magnetic Materials, Detroit, 1959, form an interesting feature of No. 8-9 issues, Volume 33 of *The Nickel Bulletin*, published by The Mond Nickel Co., which also contains about 140 abstracts covering almost every field in which nickel or nickel-containing materials are of industrial importance.

The Ross Institute Information and Advisory Service have published their fourth issue of their Bulletin No. 1 *Insecticides*, to mining companies operating in tropical areas.

Hafnium is the subject of a new U.S. Bureau of Mines bibliography, released by the Department of the Interior, and now available from the Government Printing Office, Washington 25, D.C. *The Bibliography of Hafnium*, Information Circular 7928, by E. Abshire and S. Notestine, price 25 c. was compiled to provide research and production groups with ready reference to the metal and its compounds; the 30-page publication contains 670 major entries, the contents being arranged alphabetically.

The Belmos Co., have published a booklet entitled *Simplified Short-Circuit Calculations* by R. T. Lythall, price 5s., which should prove of interest to those concerned with 400-600 volt group motor control and distribution switchboards.

A report entitled *The Mineral Resources of East and Central Africa 1954-59* has been published by the Joint East and Central African Board, a non-profit-making and non-party body representative of leading organizations and individuals having a special interest in the progress of these regions. The report, which follows one issued by the Board for 1953, has been prepared by Sir Edmund Teale. The territories covered comprise the Rhodesias, Tanganyika, Kenya and Uganda. Mineral developments in each of these territories are briefly reviewed and tables give the outputs for the years 1954-59 inclusive for each territory, allowing trends over that period for individual minerals to be readily discerned.

Mineral deposits have been examined in widespread areas of the Uganda Protectorate, states the Geological Survey Department in its annual report for 1959, of particular note being an occurrence of kaolin discovered in Koki County, Masaka District. Field investigation proved a deposit of about 2,500,000 tons of high-grade material of very fine-grained quality which may have valuable uses in industry. A local company has been formed to exploit the kaolin and markets are being sought.

Towards the end of the year an experimental aerial geophysical survey was carried out over about 700 sq. miles between Tororo and Mjanji, using a vertical intensity magnetometer and a differential scintillometer. The scheme was financed by Colonial Development and Welfare Funds and was planned by the Directorate of Overseas Geological Surveys in London. It is hoped that the

results, when available, will indicate that the methods could provide valuable information to be of use in the search for mineral deposits.

A total of 5,445 sq. miles was geologically surveyed during the year on a scale of 1:50,000 or larger, an increase of 60 per cent of the area covered in the previous year.

★

The British Solomon Islands Geological Record 1957-1958, edited by John C. Grover. Published by the Crown Agents for Oversea Governments and Administrations, 4 Millbank, London, S.W.1, on behalf of the Government of the Solomon Islands. pp. 113. Price 35s.

This publication contains 25 reports on investigations into the geology and mineral resources of the Protectorate during the years 1957 and 1958, together with lists of unpublished reports and of other research projects in hand, a bibliography, and a report on the mineralogical examination of heavy sand and gravel concentrates from Malaita. The publication is attractively presented and contains numerous maps, sketches and photographs.

The principal developments in the Solomons during 1957 and 1958 are summarized by J. C. Grover. In 1958, for the first time, since the establishment of the Survey in 1950, all the staff were engaged in areas of economic interest. The following are the immediate results of importance from this work: The Bellona phosphate reserves were shown to be substantial, though not high grade; the Hanesavo manganese

deposit was shown to be mineable; garnierite was discovered for the first time — on Santa Ysabel; chrysotile asbestos bearing areas were found and mapped on San Jorge; further mineral-bearing areas were found in the Betlonga area of the Guadalcanal Mountains.

The report adds that four areas have been made the subject of Prospecting Licences and one of these is under further application for a Mining Lease.

★

A special issue of the "Iron and Coal Trades Review", produced in collaboration with the Indian Steelworks Construction Co. (ISCON) is devoted to the Durgapur Steelworks, the contract for which was awarded to ISCON, which is a consortium of 13 British firms. Entitled *Durgapur—a Technical Survey* the publication comprises 188 pages and contains numerous illustrations and diagrams. As the Rt. Hon Malcolm MacDonald says in his foreword, Durgapur is yet another example of how fruitful co-operation between Britain and India can be, for it is the result of a partnership between them in the building and operation of one of India's huge new steelworks. All aspects of the notable achievement are covered in this very comprehensive survey.

★

Memoir No. 4 of the Geological Survey Department of Cyprus, entitled *The Geology and Mineral Resources of the Dhali Area*, pp. 116, is now avail-

able from the Crown Agents for Oversea Governments and Administrations, in London, or from the Government Printing Office, Cyprus. Price £1. The author is I. G. Gass. This memoir describes an area of 202 sq. miles, extending from Athalassa to beyond Sha. Although the northern and eastern portions are composed of sedimentary rocks, the area includes the northern part of the easternmost exposures of the igneous rocks of the Troodos Massif, including some ground covered by mining leases held by the Hellenic Mining Co. and the Cyprus Mines Corporation. The memoir and map should prove of value to those interested in the geology, petrology, palaeontology or mineral resources of this area.

★

British Standards Institution have now published Handbook No. 4: *Lifting Tackle, Part 2: Chains and Fittings*. This is a revision of the publication originally brought out in 1946, Part 1 having been published in 1959.

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"The Role of Geological Survey of India in National Planning" is the subject of an article by B. C. Roy in *Indian Minerals*, Vol. XIV, No. 1, Jan-Mar., 1960. An article by the same author entitled "Exploration for base metal ores in India and world trends" appears in the following issue (Vol. XIV, No. 2 April-June, 1960), which also contains an article on "The role of the geologist in India's progress" by M. V. N. Murthy.



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POTGIETERSRUST PLATINUMS LIMITED
UNION PLATINUM MINING COMPANY LIMITED
WATERVAL (RUSTENBURG) PLATINUM MINING COMPANY, LIMITED

(Each incorporated in the Union of South Africa)

The Boards of Directors of the above-named companies draw attention to a Statement by the Chairman of Rustenburg Platinum Mines Limited, the text of which is published below.
 January 26, 1961.

RUSTENBURG PLATINUM MINES LIMITED

(Incorporated in the Union of South Africa)

STATEMENT TO MEMBERS BY THE CHAIRMAN, **Mr. D. A. B. WATSON**, on the Directors' report and accounts for the year ended August 31, 1960

Issued to Members prior to the Twenty-ninth annual general meeting to be held in the Board Room, Consolidated Building, corner of Fox and Harrison Streets, Johannesburg, on Thursday, February 2, 1961, at 9.15 a.m.)

Profits for year ended August 31, 1960

In comparison with the previous financial year, the quantity of platinum sold was virtually unchanged but the average official price increased by £4 18s. 1d. per ounce. Furthermore, additional quantities of refined copper, nickel and gold became available during the year owing to the higher rate of mine production during 1959 and 1960, and this resulted in greater income from the sales of these metals. These favourable factors gave rise to a satisfactory increase in the net revenue from the sale of metals which, calculated on the basis of stock valuation used in 1959, amounted to £4,483,667, compared with £2,070,336 in the previous year. Attention is drawn to those paragraphs in the Directors' Report, and in this statement, which deal with the change in the basis of accounting and the effect of this change on the accounts for the year.

As shown in the published accounts, the profit for the year, after providing for taxation and the State's share of profits, amounted to £2,588,253, compared with £1,888,524 in 1959.

A transfer was made to the Stock Realization Reserve as a result of the increase in metal stocks over the year, whereas in the previous year funds were transferred from this Reserve due to the reduction in stocks over that year.

Appropriations to meet capital expenditure and other requirements amounted to £142,634 compared with £1,095,560 in 1959, the latter figure including an amount of £1,021,107 appropriated to finance capital expenditure incurred during previous years.

As a result of the improved trading profits and the considerable reduction in the sum appropriated for capital expenditure, it was possible to increase the dividend distribution from 26s. 3d. to 49s. 9d. per share after providing for the additions to metal stocks and increasing by £99,324 the unappropriated profits carried forward to the current year.

Market for Platinum and Associated Platinum Group Metals

The platinum market was active during the first half of the financial year, but

turned easier in February, 1960 and remained so during the following six months. The improvement in sales which took place during the early months of the current financial year has not been maintained and trading conditions have again become dull. The level of demand in the United Kingdom and for export to countries other than the United States has not varied significantly but the continued quiet business conditions in the United States are adversely affecting our sales in that country.

Current demand is based upon a wide and diversified field with no particular emphasis at this stage on any one branch of industrial use, and there is at present no evidence of any immediate or substantial increase in the rate of sales to the oil industry.

The official price quoted for the company's platinum has remained unchanged during the past twelve months. Russian platinum continues to be available to the market and, as a result of quiet trading conditions, the price of this platinum has tended to weaken in recent months, and continues to be lower than the official price quoted for the company's platinum.

The market for the associated platinum group metals remains relatively satisfactory, and prices have in general been maintained over the past twelve months.

Production by Rustenburg Platinum Mines

The scale of operations at the company's mines was increased during the year in conformity with the policy of building up stocks of refined metals to the levels considered sufficient to assist in meeting such surges in demand as may occur from time to time. Mine production during the current financial year has continued at a rate in excess of the level of sales. Stocks are now beginning to build up to the required levels, and the rate of output is constantly being reviewed in the light of probable sales requirements and the quantity of pipeline and refined stocks available from past production. A small and gradual reduction in the rate of mine output has been effected during recent months.

The new reduction plant at the Rustenburg section, which was brought into operation in June 1960, has operated satisfactorily and, irrespective of any further cutback in the overall rate of production, it is probable that this plant will remain in commission. The operation of each of the three available plants at a rate which is less than its capacity results in a higher metallurgical efficiency than that which would be obtained by the closure of one plant and the operation of the other two at a high rate of throughput.

Variations in the rate of mine production have in the past given rise, quite naturally, to speculation and rumour regarding the trading conditions enjoyed by the company at the time of such changes. I wish to point out that observed or rumoured variations in the rate of production at the mines should not be interpreted as signifying major changes in the outlook for the company's trading at the time such variations occur. Your Directors endeavour, in the statements issued to shareholders during the year, to give them guidance on the difficult subject of the trend of sales and revenue, and I suggest that, in general, shareholders should rely on these statements rather than upon conjecture arising from variations in the scale of mine operations.

Production from Sources other than Rustenburg Platinum Mines

Production at the International Nickel Company's Sudbury mines continued at a high rate during 1960. During the calendar year 1959 the International Nickel Company sold 384,600 ounces of platinum group metals, the second largest quantity for any year in the history of the company.

No figures are available for Russian production. As mentioned above, supplies of platinum from this source appear to be freely available to the market.

Production from other sources throughout the world continues to be relatively small in relation to the total world output.

Stock Realization Reserve—Change in the basis of Stock Valuation

During the year under review the Directors decided to adopt a new method of assessing the cost of producing platinum, this method being based upon the total costs of producing all metals, less the revenue received from the sale of by-product metals.

The revenue derived during a financial year from the sale of by-product metals is considerable and is significant in relation to the costs incurred in the production of all metals. The main business of this company is the production of platinum, and it is felt that the cost of producing that metal should, for accounting purposes, be offset by the revenue received from the sale of by-products which arise inevitably from the production of platinum itself.

The previous method of determining the cost of platinum was based upon the whole of the cost of production offset by notional values of £1 per ounce in the case of other platinum group metals produced and £1 per ton in the case of copper and nickel.

The adoption of the new basis of valuation has resulted in a fall in the book cost per ounce of producing platinum. The stocks of platinum on hand at the end of the 1959 financial year were valued at a cost, determined under the previous basis of valuation, which was somewhat higher than the 1960 net cost per ounce produced as determined on the new basis. As a result of the existence of those stocks, carrying a higher book value per ounce, the average cost per ounce of the company's platinum stocks, including new production, will for a few years be higher than the actual net cost of production as defined above, but it will gradually approximate towards that level. It can also be noted that the net cost of production will vary somewhat from year to year to an extent dependent upon the quantities of by-product metals sold in each year and the prices realized for them.

Outlook for the Current Year

As mentioned above, the improvement in sales which took place during the early months of the current financial year has not been maintained, and the average monthly rate of sales for the first five months of the current financial year is somewhat less than the average rate for the whole of the financial year ended August 31, 1960. Because the platinum market can change abruptly, either for better or for worse, it is not possible at this stage to forecast with any degree of accuracy either the probable volume of sales for the remainder of the current financial year or the average price at which such sales will be effected. With regard to the latter, the present trend of the free market price is fractionally downwards. Based on trading results to date it is estimated at this juncture that if sales are maintained at the level currently indicated and if during the remainder of the current year there is no reduction in the official price of platinum, then after meeting the charges for tax and State's share of profits and after providing for movements in the Stock Realization Reserve and for anticipated capital expenditure, the balance of profits available from the

year's operations will be about three quarters of the comparable amount for the year ended August 31, 1960.

The practice of paying an interim dividend was resumed in March 1960 and it is the intention of the Board to continue the payment of an interim dividend in future if trading conditions warrant such action. It is anticipated that an interim dividend will be declared in March of this year.

Production and Sales Policy

In last year's Statement, I set out at some length the policies agreed upon between our sole refining and marketing agent, Johnson, Matthey & Company Limited, and ourselves, in regard to our joint efforts to encourage and foster the wider and continuing use of platinum. I do not propose to cover this ground again and would merely reaffirm our views on certain important matters.

Firstly, it is our intention to ensure as far as possible that platinum, in all its forms, shall be in secure supply in order that industrial users may be satisfied that it is available for application in industry as required. To this end, adequate stocks of refined metal in its various fabricated and unfabricated forms will be maintained.

Secondly, it is our endeavour to assist in maintaining a price which, while subject to the effects of supply and demand, is not liable to those sudden and wide variations which have occurred in the past and which are not in the long-term interest of either the producer or the genuine consumer. We expect that the violent upward surges which have characterized the platinum market in the past will to some extent be controlled by virtue of Rustenburg's considerable stocks and potential productive capacity. These should assist in avoiding the recurrence of the critical shortages of platinum which have previously occurred from time to time. With regard to the strong downward movements which have on occasion taken the price to levels unrealistically low in relation to the capital employed in the production and refining of platinum, they appear to contain their own remedy in that such low prices soon check the free flow of the metal to the world's markets.

Directorate

I wish to record with regret the death on September 11, 1960, of Mr. L. D. Browne, who was alternate to Mr. W. M. Walker. On September 26, 1960, Mr. J. Hare was appointed as alternate to Mr. W. M. Walker.

Staff

I would like to express our appreciation of the excellent services rendered by the Managers and the employees on the two mines and by the technical and secretarial staffs at the Head Office.

D. A. B. WATSON,
Chairman.

Registered Office:
Consolidated Building,
Corner of Fox and Harrison Streets,
Johannesburg.
January 26, 1961.

Personal

The National Coal Board announce the appointment of Mr. W. M. Crooks as deputy chairman of their Durham Division. Mr. Crooks, who is finance director of the West Midlands Division of the Board, succeeds Mr. A. H. Kellett, who has been appointed chairman of the South Western Division. A further appointment is that of Mr. E. J. Kimmins, deputy director-general of production (operations), who is to be production director of their North Western Division, in succession to Mr. F. G. Glossop, who has been appointed deputy-chairman of the Board's East Midlands Division.

To mark his 50 years service with Automatic Telephone and Electric Co., a presentation was made to Mr. J. A. Mason, deputy managing director of the company. Mr. Mason is also chairman of A.T. and E. (Wigan), and a director of British Telecommunications Research.

Swedish General Consulting AB, a consortium of nine Swedish consulting firms has appointed Mr. Erik Zetterberg its managing director as from January 1.

Wickman Ltd. announce that Mr. H. B. Morris has been appointed to the board of the company.

Mr. R. O. Macgowan has been appointed manager, spares and service department, of Aveling-Barford, in succession to Mr. T. H. B. Whiting, who recently took up a new post as London director for the Aveling-Barford Group of Companies.

Simon Engineering announce the following appointments and changes in organization: Mr. D. T. Barritt has been appointed deputy chairman of Simon Engineering, as from January 9 last. Owing to ill health, Mr. I. Hey will relinquish the chairmanship of Henry Simon (Holdings) on March 1, but will remain a director of the company. Mr. D. T. Barritt has been appointed a director of Henry Simon (Holdings), with effect from January 9, and will take up the appointment of chairman on March 1 next. He will relinquish his executive responsibilities and his appointment as joint managing director of Simon-Carves, from the same date, but will remain a director of that company. Mr. J. P. V. Woollam has been appointed deputy chairman of Simon-Carves, as from December 12 last, and Mr. L. Brook has been appointed a director of Simon-Carves and a member of the management with effect from January 10. Mr. A. H. Bennett has been appointed a director of Henry Simon (Engineering Works), with effect from January 1, and Mr. J. G. Maclean has been appointed a director of turbine gears, with effect from January 1.

The appointment is announced of Mr. Donald P. Douglass as Deputy Minister of Mines for Ontario. He replaces Mr. H. C. Rickaby, who retired last December as deputy minister after 33 years in the public service.

WESTMINSTER BANK

VERY CONSIDERABLE ACHIEVEMENT

The Annual General Meeting of Westminster Bank Limited will be held on February 15 in London.

The following are extracts from the circulated statement by the chairman, **The Rt. Hon. Lord Aldenham**, for the year ended December 31, 1960:—

This year Westminster Bank will celebrate the 125th anniversary of its opening. The past twenty-five years have seen bigger and more rapid changes than any other comparable period of the Bank's history. At the end of 1935 the total of our Current, Deposit and Other Accounts amounted to £323 million and our Advances and Other Accounts to £115 million. At the conclusion of the year that has just passed these figures had risen to £1,009 million and £459 million respectively. Even allowing for inflation, these figures represent very considerable achievement.

During the year under review we added over 100,000 new Current Accounts. We have been amongst the leaders of progress in mechanized banking and are now on the threshold of far-reaching electronic developments.

The year 1960 was a very good one so far as the domestic affairs of our Bank were concerned, and we have been able to show a profit of £3,412,832, an increase of £906,731 over the 1959 figure. This has enabled us to raise the dividend on our "B" shares from 2s. 2d. to 2s. 8d. per share.

To meet our commitments to our customers and the call for Special Deposits by the Bank of England we have had to sell some of our investments and turn down many applications for new or increased advances. Even so, the ratio of our liquid assets to deposits has been severely squeezed.

The increase in crime, and especially of robbery with violence, causes very great concern to the Bank since it affects not only our property but also, and more importantly, the lives and welfare of our Staff. Security measures are constantly being reviewed and new methods adopted; about these measures we can, for obvious reasons, say nothing.

In many ways the past year has been in marked contrast to 1959. The country's balance-of-payments figures have become disquieting; and signs of renewed inflation have begun to appear. In these circumstances, there is no doubt that credit restriction was necessary; but it is surely contrary both to justice and efficiency that, in spite of many recommendations, no way should yet have been devised for including other financial institutions in the restrictions that have been applied to the Banks.

Special Deposits

Arrangements were made in 1958 whereby the Bank of England could call for Special Deposits from the Clearing Banks and the Scottish Banks as a weapon to control the ability of those banks to increase their advances to customers. At the time these arrangements were made they were said to be available pending the report of the Radcliffe Committee; but although that Committee reported strongly against calls for Special Deposits from the Clearing Banks unless accompanied by general restrictions on all classes of lenders, yet

calls of 2% of total deposits in the Clearing Banks were made during 1960, and that 2%, together with 1% from the Scottish Banks, amounting in total to £150 million, continues to be held by the Bank of England.

At the same time opinion seems to be tending towards regarding a 30% liquidity ratio as a minimum; which further restrains our ability to lend, by compelling us to keep a higher ratio throughout the year than prudent banking requires, in order to maintain the minimum during the early months of each year, when the taxation drain on our customers reduces our deposits. Moreover, a fixed minimum liquidity ratio defeats the whole object of liquidity since those assets can then never be used to meet unexpected calls on bank's cash. A plan which required an average liquidity ratio over the year would be much more acceptable.

The worsening of our balance-of-payments was largely due to the failure of our exports to grow, whilst our imports did grow greatly. It is disappointing that we have not retained our share of exports: we do not seem to have been determined enough in selling abroad.

Much attention has been given during the year to the steady increase in our gold and dollar reserves; but in view of our failure to earn a surplus abroad, the increased reserves can be accounted for only by the large inflow of West European and American capital, some of it for permanent investment here, but much of it a quite temporary movement of money to take advantage of the high rates of interest prevailing in London. In spite of the adverse balance-of-payments, the inflow of money has kept sterling strong throughout the year.

During 1959 we made a large additional subscription in gold to the International Monetary Fund, and there is no reason why we should not make readier use of this our second line of reserve by drawing on our increased quotas in the I.M.F., in order to tide us over temporary strains.

Since April the buoyancy has gone out of the figures of national production and, since there have been a greater number of people in employment, this means that productivity has stopped rising. Our official unemployment figures have improved: but they disguise quite a lot of short-time working, especially in the motor industry.

Outlook for 1961

The general outlook for 1961 is uncertain. Apart from the many clouds on the political horizon, our economic prospects, like those of the rest of the free world, will remain unsettled until there are signs that the new Administration is managing to pull the United States out of their present recession.

The balance-of-payments is the key to our economic problem. Unless it can be improved by increasing exports, we shall have to reduce our imports, with the result that there will have to be contraction rather than expansion at home.

Despite our problems, we are still enjoying a high degree of prosperity: but it seems likely that 1961 will prove a difficult and therefore a challenging year for us all.

Coming Events

The Second International Conference organized by the Institute of Materials Handling is to take place in Southport from May 10 to 12, 1961. Brochures may be obtained from the Institute of Materials Handling, London.

A Symposium on "User Experience of Large-Scale Industrial Vacuum Plant" is to be held at the Institution of Mechanical Engineers, on March 1-2 next. The Symposium is sponsored by the Joint British Committee for Vacuum Science and Technology.

"Electricity in the Prosperity and Welfare of the Nation" is to be the theme of the 13th British Electrical Power Convention, which is to be held at Eastbourne, June 12-15, next, under the presidency of Sir John Pickles, chairman of the South of Scotland Electricity Board.

The Sixth Salon International de la Chimie and the Conference Internationale des Arts Chimiques, which had been provisionally arranged for June, 1962, will be held from April 25 to May 4, 1962 inclusive, at the Centre National des Industries et des Techniques (C.N.I.T.) Paris. Information may be obtained from the General Secretariat of the Conference Internationale des Arts Chimiques in Paris.

The First International Symposium on Agglomeration, which is arranged for April 12-14 next, in Philadelphia, by the American Institute of Mining, Metallurgical and Petroleum Engineers, will be attended by representatives from four continents.

Company News

The Holman Group have opened new offices and a show room in Bristol, to serve the West of England area. This is Holman's seventh branch office in Great Britain. Mr. J. C. Holman is manager of the Bristol branch.

Officials from the Berliet company, French truck manufacturers, have visited the Perkins Group. Berliet are offering a six-cylinder Perkins engine in their 4½ ton forward control truck. This is the first time that they have used a power unit made by another manufacturer.

The British Standards Institution has recently issued a publication B.S. 3289: 1960 entitled British Standard for Conveyor belting for underground use in coal mines, which is based on the National Coal Board specifications. This may be obtained from the British Standards Institution Sales Branch, in London, price 5s.

The theme of the Firth-Vickers Stainless Steels stand at the Engineering, Marine Welding and Nuclear Energy exhibition in April next will be technical collaboration between producer, fabricator and designer.

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